

A REVISION OF THE GOBIID GENUS *BRYANINOPS* (PISCES), WITH A DESCRIPTION OF SIX NEW SPECIES

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ABSTRACT

The tropical Indo-Pacific gobiid genus *Bryaninops* Smith is reviewed and the genus *Tenacigobius* Larson and Hoese included as a synonym. These small fishes are commensal chiefly on gorgonians and antipatharians. The three previously-known species, *Bryaninops erythrops* (Jordan and Seale), *B. ridens* Smith and *B. yongei* (Cohen and Davis), are redescribed and figured. Six new species are described: *B. amplus*, *B. dianneae*, *B. isis*, *B. loki*, *B. natans* and *B. tigris*. These species may be distinguished from each other by a combination of characters including extent of gill opening, pectoral ray counts, scalation, teeth, colour pattern, invertebrate associate specificity and proportions of head and body. A key to the species is included.

KEYWORDS: taxonomy, ecology, Gobiidae, *Bryaninops*, *Tenacigobius*, Indo-Pacific species, new species, commensals, gorgonians, corals.

INTRODUCTION

Many of the smaller coral reef gobiid fishes are poorly known or undescribed. Gobies of the genus *Bryaninops* Smith are small (usually less than 40mm SL), commensal, cryptically coloured, shallow-water species. They are generally not well represented in museum collections. Three species are known from the literature: *B. yongei* (Cohen and Davis) and *B. erythrops* (Jordan and Seale), which were first placed in the genera *Cottogobius* Koumans and *Chaenogobius* Gill respectively (Larson and Hoese 1980), and *B. ridens* Smith. As a result of recent collecting, six new species have been found, three of which are widely distributed and often abundant. Many of the collections were made at Lizard Island, on the Great Barrier Reef in Australia, where *Bryaninops* are common and easily observed.

Bryaninops is most closely related to four similar genera: *Lobulogobius* Koumans, *Pleurosicya* Weber, *Luposicya* Smith and an undescribed genus. These genera share the following pelvic fin form: cup-like fins, nearly always with a folding-forward of the pelvic frenum and thickening of the skin around the pelvic spines to form lobes. They are commensal

with invertebrates and the pelvic fin structure seems to help them cling efficiently to their invertebrate associate, which may grow in strong currents.

Bryaninops was erected in 1959 by Smith for his new species *B. ridens*. Smith separated the genus from *Pleurosicya* and *Luposicya* mainly because the anterior half of the body was naked, with 35 rows of small scales present posteriorly. An examination of the holotype of *B. ridens* showed that the lateral line canal and pore pattern was similar to that in *Tenacigobius* Larson and Hoese, *Lobulogobius* and an undescribed genus (in which Smith's *Cottogobius platycephalops* belongs). Additional specimens of *Bryaninops ridens* and a new species (described below) were collected on the Great Barrier Reef. These were compared with *Tenacigobius*, a genus proposed by Larson and Hoese in 1980 for *Cottogobius yongei* Davis and Cohen and five new species (described below). Both *Bryaninops* species have short snouts, distinctive fixed upright even teeth which tend to angle outward at the front of the lower jaw, with no large canines laterally on the lower jaw, which is curved upward anteriorly (less so in the new species) and is roughly triangular in shape from a ventral view. The seven *Tenacigobius* species usually

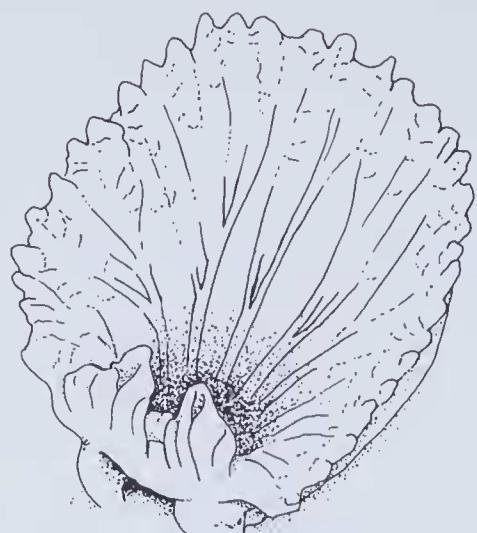


Fig. 1. Ventral view of *Bryaninops* pelvic fins, showing pelvic spine lobes and pocket in frenum (folded forward).

have medium to long snouts; a straight lower jaw, rounded in ventral view; a series of fixed curved teeth arranged in rows of different sizes and a large lateral canine on each side of the lower jaw. In addition, *Bryaninops* species possess a small posterior process on the short curved premaxilla, while *Tenacigobius* have no such process and a generally straight premaxilla. These differences were considered to have been sufficient to separate the species groups into different genera.

Characters of both these genera were compared with those of *Lobulogobius* (2 species), *Cottogobius platycephalops*, *Luposicya lupus* Smith and *Pleurosicya*. *Lobulogobius* and *C. platycephalops*, although they share the pore pattern of *Bryaninops*, remain separated by having their gill openings free of the isthmus, the horizontal teeth, the nature of the pelvic and pectoral fin ray branching and other characters. *Luposicya* has several unique characters, chief of which is the lower lip being free at the chin and fused along the sides of the mandible (other genera have the lip fused to the chin and free along the sides).

An examination of the species assigned to *Pleurosicya* (11 nominal, about 16 actual) revealed that they are united by headpore pattern as well as tooth pattern: rows of fine small teeth, always with one or more rows of moveable

horizontal straight teeth in the lower jaw (present anteriorly only in some species). However, the variation among *Pleurosicya* species in snout length and shape, tooth shape and arrangement, and jaw osteology within the basic arrangement described, is as great as that between *Bryaninops* and *Tenacigobius*. Maintaining *Tenacigobius* separate from *Bryaninops* would, to be consistent, require the creation of several genera from among the species of *Pleurosicya*. Therefore *Tenacigobius* must become a junior synonym of *Bryaninops*.

Bryaninops remains separated from *Pleurosicya* by headpore and canal arrangement (*Pleurosicya* with fused interorbital canals and one anterior interorbital pore present; *Bryaninops* with separate interorbital canals and a pair of anterior interorbital pores), teeth shape and arrangement (as described above), sealation (29-60 small scales in *Bryaninops*, 20-31 larger scales in *Pleurosicya*), fifth pelvic ray branching (base of ray is slender and usually branches three or four times in *Pleurosicya*; usually branches one or two times in *Bryaninops* with the ray base broad and flattened), general host preference (*Bryaninops* species found mostly on gorgonians, antipatharians and stony corals; *Pleurosicya* mostly on alcyonarians, sponges and hydrozoans), and the upper hypural shape (always rodlike in *Pleurosicya*; sometimes reduced to a small stub in *Bryaninops*).

Counts and measurements follow Hubbs and Lagler (1958). Measurements were made by microscope with an ocular micrometer, and needlepoint dividers. The transverse scale count backwards (TRB) is made from the anal fin origin upward and backward to the second dorsal fin base. Head length (HL) is measured to the upper attachment of the opercular membrane. Gill raker counts include all rudiments. Pectoral ray counts often vary from left to right side of the fish; whenever possible pectoral counts were made from the left pectoral. An asterisk indicates counts of holotype in the species descriptions. Numbers in parentheses after particular counts indicate the number of specimens with that count, or the range of counts.

Type specimens are deposited at the following institutions: the Australian Museum, Sydney (AMS); Academy of Natural Sciences, Philadelphia (ANSP); British Museum (Natural History), London (BMNH); Bernice P. Bishop Museum, Honolulu (BPBM); California Academy of Sciences, San Francisco (CAS); Laboratory of Ichthyology, The Crown Prince's Palace, Tokyo (LICPP); Victoria Museum, Melbourne (NMV); Museum National d'Histoire Naturelle, Paris (MNHN); Northern Territory Museum of Arts and Sciences, Darwin (NTM); Queensland Museum, Brisbane (QM); Royal Ontario Museum, Toronto (ROM); South Australian Museum, Adelaide (SAM); Senckenberg Museum, Frankfurt (SMF); National Museum of Natural History.

canal above posterior edge of eye. Head, pectoral base and breast naked, rest of body variably covered with small ctenoid scales (usually 30-60 in longitudinal count). Transverse scales 1-17 (Tables 2 and 3). Eyes moderately large, placed dorsolaterally.

Jaws with inner band of fine pointed teeth, an outer row of large curved teeth, and pair of canines (present in all species) placed behind these rows at symphysis of lower jaw. Outer row teeth much enlarged in males, but generally reduced in females. In most species, at least 1 canine always present at midside of lower jaw, which is slightly curved upward. Outer row of large teeth in upper jaw generally restricted to front of jaw. Tongue usually bi- or trilobed. Gill

Table 1. Frequency distributions for numbers of pectoral fin rays, dorsal and anal fin elements of the species of *Bryaninops* (asterisks indicate counts of holotypes).

	Pectoral rays						Second dorsal fin elements				Anal fin elements			
	I2	I3	I4	I5	I6	I7	I,6	I,7	I,8	I,9	I,6	I,7	I,8	I,9
<i>amplus</i>			3	21	83*	40	1	11	132*	2	1	11	111*	23
<i>dianaeae</i>					1*	1			2*					2*
<i>erythrops</i>		6	48*	17	2			5	65*	2		2	68*	2
<i>isis</i>	1	1	32*	4					37*				31*	5
<i>loki</i>		3	43	40*	10	1		6	89*	1		1	68*	28
<i>natans</i>			12	93*	18	1		4	114*	9			18	108*
<i>ridens</i>		10	19*	2				1	22*					23*
<i>tigris</i>	1	34*	2					2	33*				16	16*
<i>yongei</i>		1		30*	37	5		2	38*	34		1	27*	45
														1

tory, Washington (USNM); Western Australian Museum, Perth (WAM); Yokosuka City Museum, Yokosuka (YCM).

SYSTEMATICS

Genus *Bryaninops* Smith

Bryaninops Smith, 1959:216 (type species *B. ridens* Smith, 1959, by original designation).

Tenacigobius Larson and Hoese, 1980:39 (type species *Cottogobius yongei* Davis and Cohen, 1969, by original designation). Syn. nov.

Slender gobies with united cup-like pelvic fins, frenum nearly always folded to form an anteriorly-facing pocket, skin covering pelvic spines thickened, forming lobes (Fig.1). Pectoral rays 12-17, lowermost few rays usually unbranched and somewhat thickened. Second dorsal rays I,6-I,9; anal rays I,6-I,10 (Table 1). Two separate interorbital lateral line canals present, usually with interconnecting

opening extends from upper pectoral base to below pectoral base or to under eye.

Bayer and Harry-Rofen (1957) first noted the association of *Bryaninops* and coelenterates in Palau, where they observed the gorgonian seawhip *Junceella* and an undescribed goby 'allied to the genus *Cottogobius*'. The fish pick plankton drifting past, by rapidly darting out a short distance into the water column to take a food item before darting back to cling to its associate. Most *Bryaninops* species will not voluntarily leave the associate unless unduly stressed (by rotenone or a diver attempting its capture). When a fish does leave the associate under these conditions it swims in short bursts, propelled mostly by the pectoral fins, and searches immediately for a substrate on which to cling.

Some gobiid fishes such as the coral commensal *Paragobiodon* (Lassig 1977),

Table 2. Frequency distribution of transverse backward scale counts of the species of *Bryaninops* (asterisks indicate counts of holotypes).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
	Number of TRB scale rows																	
<i>amplus</i>						1				2	8	9	16	25	26	19*	10	5
<i>dianneae</i>										1	1*							
<i>erythrops</i>		1	1				4	8	11	26*	3	3						
<i>isis</i>									2	9	15*	5						
<i>loki</i>						1	1	1	12	21	18*	7						
<i>natans</i>	34	14	5	1	1	1*												
<i>ridens</i>				1	3*	1	1	6	1	4								
<i>tigris</i>								2	8*	12	6	1						
<i>yongei</i>			1					1	3	5	13	22*	10	8	2		1	

Table 3. Frequency distribution of longitudinal scale counts of the species of *Bryaninops* (asterisks indicate counts of holotypes).

	19	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	Number of longitudinal scale rows																
<i>amplus</i>																1	3
<i>dianneae</i>								1			1						
<i>erythrops</i>																1	
<i>isis</i>																1	
<i>loki</i>															2		1
<i>natans</i>	1	2	1	4	4	8	3	3	5	*9	6	6	5	1	1	3	
<i>ridens</i>						1		1	1	1		2	2	*2	3	2	3
<i>tigris</i>												1		1			3
<i>yongei</i>					1			1			3		7	2	3		3
	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
	Number of longitudinal scale rows																
<i>amplus</i>	1				2			3	4	7	4	6	9	1	7	7	9
<i>dianneae</i>																1	
<i>erythrops</i>	3	*5	5	5	.5	11	4	4	3	2	1	1	2				
<i>isis</i>	1	1		2	5	3	4	2	*4	3	3	1	1			1	
<i>loki</i>	1	3	5	2	4	5	4	9	8	5	8	3	3	*2	2	2	2
<i>natans</i>				1													
<i>ridens</i>	1																
<i>tigris</i>	1			2		2		2	2		2	1		1	1	2	*1
<i>yongei</i>	5	4	4	6	3	4	3	*2	2	1	2	2		1	1		1
	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	
	Number of longitudinal scale rows																
<i>amplus</i>	4	9	5	*5	6	4	1	2	2	3		1	2				1
<i>dianneae</i>		*1															
<i>erythrops</i>																	
<i>isis</i>																	
<i>loki</i>																	
<i>natans</i>																	
<i>ridens</i>																	
<i>tigris</i>	1	1				3											
<i>yongei</i>	1	1			1												

and several Caribbean gobies (Robertson and Justines 1982) have been known to change sex. In *Paragobiodon*, a group of females and 1 male inhabits each coral colony. Removal of the male causes the

largest female to become a male. *Bryaninops* may be protogynous also, as several species live in colonies in which there are many females and 1 or a few males. Field or aquarium study is needed to test this.

The known distribution of *Bryaninops* species largely reflects collecting effort. They occur from the Seychelles across to the Pacific as far as Rapa and Hawaii, with only 3 species entering the Red Sea.

Osteological characters based on 3 specimens (2 *B. amplus* sp. nov. and 1 *B. yongei*) include: branchiostegal rays 5; no dorsal post-cleithrum; no mesopterygoid; metapterygoid not in contact with quadrate; posterolateral flange of hyomandibular in contact with dorsal process of preopercle; no preopercular process connecting symplectic; sphenotic with pointed flange forming part of posterior edge of orbit; frontal short, with wide posterior wings, and raised angled ridge around dorsal and posterior part of orbit; supraoccipital with sagittal crest posteriorly, and lateral wings anteriorly; sphenotic with dorsal process extending upward to meet supraoccipital, separating frontals from epiotics; glossohyal broad, spatulate; scapula absent; vertebrae 10 + 15 plus urostylar centrum (26); dorsal ribs associated with vertebrae 1-10 or 11 to all ribs attached and elongate; ventral ribs on vertebrae 3-9, ventral postcleithrum below vertebra 2; anteriorly-directed fingerlike ventral processes of each pelvic bone contiguous, tips slightly expanded or knoblike, and do not diverge greatly; pelvic spines slightly to quite curved, with flattened knob at tips in large specimen; caudal skeleton with upper and lower hypural plates fused to urostyle; single epural with large dorsal flange; upper hypural narrow, splint-like or a short stub, articulating with upper hypural plate; parhypural free, with thin ventral flange.

Key to Species of *Bryaninops*

1. Curved canine tooth at middle of side of lower jaw, jaw rounded in ventral view, rows of different-sized sharp curved teeth present 3
No curved canine at midside of lower jaw, jaw somewhat triangular in ventral view, rows of upright even pointed teeth present, mostly toward side of jaw 2
- 2(1). Body usually fully scaled, scales reaching to pectoral base (33-50)

- lateral rows); snout short (30% in HL); gill opening reaching nearly to eye; commensal only on *Isis hippuris* (Western Pacific) *isis*
Body usually partly scaled, scales reaching to below 2nd to 4th first dorsal spines or less (31-37 lateral rows); snout very short (26% in HL); gill opening reaching to preopercular edge or a little beyond; commensal on *Porites* and *Millepora* spp (Red Sea, Indo-West Pacific) *ridens*
- 3(1). Pectoral rays unbranched at all sizes; gill opening extends to below posterior edge of eye; ventral half of body dark to dusky (deep violet-red when live), internal bars rarely visible (Indo-West Pacific) . *erythrops*
Some pectoral rays always branched (unless 10-11mm juvenile); gill opening variable; usually faint or dark internal bars visible or with head and body compressed and eyes lateral 4
 - 4(3). Pectoral rays 13 (rarely 12 or 14); gill opening to lower pectoral base or slightly further forward (Indo-West Pacific) *tigris*
Pectoral rays 14-17 (rarely 13); gill opening variable 5
 - 5(4). Posterior interorbital pore or pair of pores absent; scales on sides of body usually extend only as far forward as second dorsal fin origin; TRB only 1 or 2 scale rows; head and body compressed (Red Sea, Indo-West Pacific) *natans*
Posterior interorbital pore or pores usually present; scales on sides usually extend forward to behind pectoral fin; TRB 9-14; head somewhat depressed 6
 - 6(5). Gill opening restricted, extending to lower edge of pectoral base and occasionally reaching forward to below posterior margin of preoperculum 7
Gill opening wider, extending forward to posterior edge of eye or at least past posterior margin of preoperculum 8

7(6). Body bars golden-brown to brown when live, generally distinct in preserved material; head depth 50% or more of head length; scalloped grooves present along lower edge of preoperculum (Red Sea, Indo-West Pacific) *yongei*

Body bars brownish-orange to red when live; usually indistinct in preserved material; head depth less than 50% of head length; no scalloped grooves present along lower preopercular edge (occasionally slight indentations along margin) (Indo-West Pacific) *amplus*

8(6). Head and body very slender (BDA 8 times in SL); head depth at least 2.5 in head length; snout narrow; pelvies broad and flattened and reach anus; pelvic frenum smooth, without folded-forward pocket (Fiji Islands) *dianneae*

Head and body not so slender (BDA 6-8 in SL); head depth usually twice in head length; pelvies cup-like, do not reach anus, pelvic frenum with anteriorly-facing pocket (Indo-West Pacific) *loki*

Bryaninops yongei

(Davis and Cohen), comb. nov.
(Figs 1-4)

Cottogobius yongei Davis and Cohen, 1969: 749-769.

Tenacigobius yongei — Larson and Hoese 1980.
Tenacigobius sp. 9 — Wass 1984.

Type material. HOLOTYPE - USNM 200402, ♂ 23mm SL, Borneo, Darvel Bay, west of Tatagan Island, living on *Cirrhipathes* whip, 5-6m, hand, W.P. Davis and D.M. Cohen, 7 February 1965. PARATYPES - USNM 200403, 7 specimens (spec.), 10.5-24mm SL, same data as holotype.

Additional material. HAWAII: USNM 203238, 2 spec. both 20mm SL, Oahu, LahiLahi Point, 26 May 1968; USNM 203237, 2 spec. 13.5-14mm SL, Puako, November 1967. AUSTRAL ISLANDS: BPBM 17190, ♂ 19mm SL, Rapa Island, north of Rapa Iti, off entrance to Haurei Bay, 27 January 1971. WEST PACIFIC: AMS I. 21389-001, ♀ 17 mm SL, American Samoa, Tutuila, Pago Pago Bay, 24 May 1979; AMS I. 20725-002, 3 spec. 19.8-26mm SL, American Samoa, Tutuila, Pago Pago Bay, 27 October 1978; AMS I. 22931-001, ♀ 16.5mm SL, Fiji,

Malololailai, 28 March 1980; CAS 36876, ♂ 21.5mm SL, Palau, Iwayama Bay, shore of southeast peninsula of Koror Island, at mouth of Oyster Pass, 18 October 1955. JAPAN: LICPP 1977049, 2 spec. 14.5-25mm SL, Okinawa, Kuroshima, Ishigaki City, 3 September 1977. WEST INDIAN OCEAN: ANSP 152964, 2 spec. 18-23mm SL, Amirantes Islands, D'Arros Island, off east end of island, 6 March 1964; ANSP 152484, ♂ 20mm SL, Seychelles, off north tip of Mahe Island, north of North Island, 15 February 1964. QUEENSLAND, GREAT BARRIER REEF: AMS I. 22613-035, 2 spec. 24.5-25mm SL, North Escape Reef, 1 November 1981; AMS I. 22932-001, 2 spec. 18.5-21mm SL, Lizard Island, North Point, on dropoff, 13 February 1975; AMS I. 22933-001, 2 spec. 24-26mm SL, Lizard Island, off Chinaman's Head, 13 November 1975; AMS I. 22934-001, ♀ 24mm SL, Lizard Island, between South and Palfrey Islands, over reef edge, 13 November 1975; AMS I. 22935-001, 2 spec. 20.5-25mm SL, Lizard Island, off Granite Bluff, 4 November 1975; AMS I. 22936-001, 2 spec. 19-20mm SL, Lizard Island, coral cliff between Bird Islet and South Island, 16 November 1975; AMS I. 22937-001, 2 spec. 18-18.5mm SL, same locality as preceding; AMS I. 22938-001, 3 spec. 15-20.5mm SL, Lizard Island, North Point dropoff, 2 November 1975; AMS I. 22939-001, 2 spec. 24.5-26.5mm SL, Lizard Island, Mrs Watson's Beach, 17 November 1975; WAM P. 28038-001, 2 spec. 19-23.5mm SL, same data as preceding; AMS I. 22940-001, 2 spec. 21.5-25.5mm SL, Lizard Island, Sand Cay, north side on reef wall, 9 November 1975; QM I. 20387, 2 spec. 15-18mm SL, same data as preceding; NTM S. 10841-001, 4 spec. 14-26.5mm SL, Lizard Island, North Point, 4 February 1977; AMS I. 22957-001, ♂ 22mm SL, Lizard Island, North Point, 22 November 1975; NMV A. 3251, ♀ 14.5mm SL, same locality as preceding; SAM F. 4736, 3 spec. 14-22.5mm SL, Lizard Island, east side of North Point, 28 November 1975; AMS I. 22941-001, ♀ 24mm SL, Lizard Island, outer reef slope between Bird and South Islands, 1 February 1977; NTM S. 10839-001, 2 spec. 20.5-21.5mm SL, same data as preceding; CAS 53207, 2 spec. 23-25mm SL, same data as preceding; NTM S. 10840-001, 2 spec. 25.5-26.5mm SL, Lizard Island, coral cliff between Bird and South Islands, 14 February 1977; BPBM 29314, ♂ 19.5mm SL, Yonge Reef, groove by reef wall, 26 November 1975; ANSP 152483, ♂ 27mm SL, Yonge Reef, sandy valley with vertical coral cliffs, 12 November 1975; AMS I. 24062-001, 3 spec. 11-28mm SL, Yonge Reef, on dropoff on outer reef, 7 February 1977; AMS I. 24063-001, 2 spec. 20-24mm SL, Swains Reef, 15 September 1974; AMS I. 24064-001, 2 spec. 18-19.5mm SL, John Brewer Reef,

15 February 1974; ROM 43005, ♂ 21.5mm SL, Wheeler Reef, northeast of Townsville, 9 October 1977; QM I. 20388, ♂ 18.5mm SL, 50 miles east of Cardwell, Sand Cay Reef, 26 March 1977; AMS I. 20965-001, 2 spec. 22-24mm SL, northeast of Dunk Island, western face of No Name Reef, 27 February 1979.

Diagnosis. A small goby (up to 30mm SL), compressed posteriorly and roughly triangular in cross-section anteriorly, with flattened apex dorsally. Second dorsal rays usually 1,8-9; anal rays usually 1,8-9. Pectoral rays usually 15-

15(1), 17(6). Branched caudal rays 9(1), 11(3), 12(2), 13(1). Gill rakers very short, stubby, with fine spines. Lower quarter or less of first gill arch bound by membrane to opercular wall. Rakers 2+1+7 (4), 2+1+8 (1), 3+1+7 (2). Vertebrae 10+15 (plus urostyle) = 26 (2).

Body moderate, rounded anteriorly, compressed posteriorly. Range of morphometrics in Table 4. Body depth at anus averages 15% (12.4-18.4%) of SL. Head length averages 31% (27.8-35.6%) of SL, head width greater than head depth. Head appears square in cross-section. Head depth averages 54% (43.8-60.9%) of head length. Snout appears roughly square to rectangular when viewed from above. Eye 28% (21.3-32.0%) of head length, placed dorsolaterally. Jaws reach to below mid eye or to anterior half of eye. Tongue trilobed, occasionally blunt or rounded. Teeth as in generic diagnosis, but with considerable sexual dimorphism. Females with only 1 or 2 caniniform teeth in the upper jaw. Lower jaw symphyseal teeth and large teeth on mid-side of the jaw often reduced in size. Males may have 7 or 8 large curved teeth across fronts of both jaws, with teeth at sides of jaws (often the largest) flared outwards. Large males (such as holotype) have teeth at sides of lower jaw which may be large, almost straight and project nearly horizontally.

Lateral line canals of head as in Fig. 2; often interconnecting canal across interorbital is absent, or canals may be open. Sensory papillae of head as in Fig. 3, with small fleshy suborbital knob present. A groove may be present under eye, incorporating row of cheek papillae. Lower preopercular edge sculptured around 3 or more shallow grooves; each groove containing row of 2-4 sensory papillae. Underside of lower jaw alongside lip and lower end of opercle may be scalloped also.

Arrangement of scales on body variable; may extend only as far as to below sixth dorsal spine (as in many specimens from Lizard Island, Qld) or reach forward to just over opercle, leaving most of area behind pectoral fin naked (as in most Hawaiian specimens). In juvenile specimens

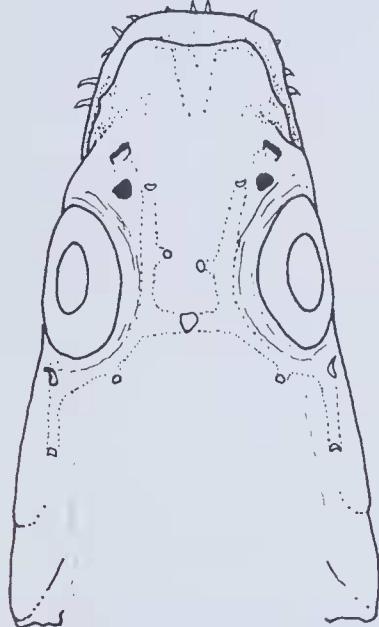


Fig. 2. Lateral line canals and pores in *Bryaninops yongei* holotype.

16, lowermost 3-6 rays unbranched and somewhat thickened distally. Pelvic fins cup-like, with pocket-like frenum thickened, folded and lobed; membrane surrounding pelvic spines also thickened and rugose. Anterior preopercular edge slightly scalloped, grooves present containing sensory papillae. Gill opening reaches ventrally to below pectoral base. Teeth sexually dimorphic. Mean longitudinal scale count 40, TRB 12.

Description. First dorsal spines VI (in 74)*; second dorsal 1,7-1,9 (1,8 in holotype) Anal 1,7-1,10 (1,8 in holotype). Pectoral rays 13-17 (15 in holotype). Longitudinal scale count 26-58, with mean of 40 (44 in holotype). TRB 3-16, mean of 12*. Anal rays unbranched. Most dorsal rays unbranched. Segmented caudal rays

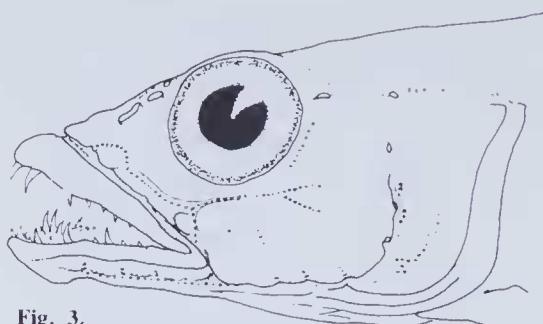


Fig. 3.

Head papillae of *Bryaninops yongei*, 25mm SL ♂. Longitudinal seales are restricted to mid-sides, and may not reach forward to below first dorsal fin. Midline of belly naked.

Pelvie fins short, 18% (13.3-21.5%) of SL, not reaching anus, generally eup-like in form, although occasionally flattened. Pelvie spine lobes variably developed, often elongated and much-folded. Pelvic spines curved inward. Davis and Cohen (1968, figs. 5 and 6) illustrated the pelvic fins.

Female genital papilla short, bulbous, with 2 or more lobes at tip. Male genital papilla short and flattened, broad at base, narrower at tip, which is slightly expanded and fimbriate.

Colour in life. Head and body transparent, with vertebral column and

Table 4. Proportional measurements of *Bryaninops yongei* expressed as percentages of standard length (or head length where indicated). N = number of specimens.

	Holotype USNM 200402	Range	Male Mean	N	Range	Females Mean	N
Standard length	23	13.5-27.0	22.9	34	13.5-28.0	19.9	33
Head length	31.3	29.1-35.6	31.2	34	27.8-34.3	31.4	33
Head depth	16.9	14.4-18.8	16.6	34	14.2-20.7	16.7	33
Head width	18.7	17.2-22.7	20.7	33	16.8-22.5	19.5	33
Body depth at anus	15.2	12.4-16.5	14.8	33	12.8-18.4	14.9	32
Caudal fin length	19.6	16.7-21.7	19.3	33	15.8-21.7	19.1	33
Pectoral fin length	19.1	16.0-22.0	20.1	34	15.5-22.9	19.6	33
Pelvic fin length	17.0	15.2-21.5	18.3	34	13.3-21.3	18.3	33
Snout length (in HL)	29.2	25.6-39.0	31.9	34	21.3-36.3	29.7	33
Eye width (in HL)	25.0	24.4-31.7	27.9	34	21.3-32.0	28.1	33
Upper jaw length (in HL)	44.4	34.9-50.6	45.8	34	36.8-46.5	41.7	33
Interorbital width (in HL)	19.4	11.0-17.9	14.8	34	7.9-21.7	15.2	33
Caudal peduncle length	21.3	13.9-21.9	17.9	33	13.1-23.0	18.0	32
Caudal peduncle depth	10.0	6.7-12.1	8.5	34	4.6-9.6	8.0	33



Fig. 4. *Bryaninops yongei* on *Cirrhipathes* whip at Yonge Reef, Qld, 12m depth. Photo by Neville Coleman.

peritoneum white to silvery-white or light gold (Fig.4). Three brown bands overlying peritoneum (bands appear as roughly rectangular blotches when viewed from side). Three more brown blotches within the body musculature along ventral midline posteriorly, last blotch just before caudal fin. These ventral blotches range in colour from rich brown to khaki-brown to red or gold-tinged brown. Six narrow bars extend from ventral blotches past vertebral column, forming distinct spots dorsally where bars reach body surface. Bars may be same colour as ventral blotches or be brighter red or golden colour. Underside of body, especially along anal fin, may be mottled lightly with brown, intensified at base of each large ventral blotch.

Pectoral base covered with large brown or reddish blotch, occasionally forming an intense curved streak. Head with brownish blotches on opercle, along edge of preopercle, and scattered spots around eye and suborbital (these markings variable). A distinct red to red-gold stripe extends from eye to eye around snout, covering tip of upper lip. Dorsal surface of head with paired reddish spots, and band joining eyes across posterior interorbital space. A second, broader band may extend across space just behind eyes. Surface of brain visible, with golden to reddish variable markings. Eyes bright golden, with edge of eye usually darker, rimmed in red or golden-brown. Ventral half of eye often vermiculated with red or brown as an extension of the snout stripe. Lips, especially upper, often light yellow-gold.

Fins clear, pelvics maybe slightly yellowish. Some heavily marked specimens have red anal fins, red dorsal fin bases and ventral half of caudal red. Occasionally a blotch present at lower caudal fin base, usually reddish or brown. Live colouration well illustrated by Davis and Cohen (1968) and Coleman (1974).

Colour in alcohol. Much of colour pattern obscured by musculature. Pectoral base stripe, snout stripe, dorsal spots and bases of ventral blotches usually visible. Brown body bars often visible through body wall.

Comparisons with other species. One of 3 species with a restricted gill opening, *B. yongei* is distinguished from the other 2 (*B. amplus*, *B. tigris*) by a combination of characters including: 15-16 pectoral rays, scalloped grooves along preopercular edge, head depth greater than 50% of head length, and body somewhat stocky (HL 31% of SL). The species figured by Axelrod and Burgess (1976) as *Cottogobius yongei* refers to *B. amplus* sp. nov.

Remarks. *Bryaninops yongei* is found in association with the antipatharian sea whip, *Cirrhipathes anguina* (Dana). The whip is locally common on coral reefs, but is rarely abundant. It may be found on dropoffs in strong current, or on more sheltered back-reefs, at depth ranging from 3-45 meters. *B. yongei* occurs in male-female pairs, one pair per whip, with one to several juveniles sometimes present. Sex reversal probably occurs, with the largest juvenile first settling out on the whip becoming the male, the next largest remaining female. Occasionally, there will be another female present, a little smaller than the male-female pair. Four *B. yongei* have been collected from a single whip: a male and female 26mm SL, one male 22mm SL and a 14mm juvenile (probably female). Although the *C. anguina* were not measured when collecting *B. yongei* from them, it would appear from underwater observations that long whips (1.5-2m) support large adults and groups of juveniles, while shorter whips (less than 1m) tended to support only one or a pair of adult fish or several juveniles.

Nests of *B. yongei* have been observed at Lizard Island. On the seawhip, a band about 2.3cm wide is cleared of living tissue, at a spot 15 to 25cm down from the tip. The eggs are laid in a wide band over the exposed skeleton.

This species is common from Indonesia eastward to Hawaii. So far only three specimens are known from the Indian Ocean (Seychelles) and Amirantes Islands. The seawhip *Cirrhipathes anguina* has also been recorded from the Maldives. Goren (1983) has recorded *B. yongei* from the Red Sea (Elat), living on a *Cirrhipathes* sp.

Bryaninops amplus sp. nov.
(Figs 5,6)

Type material. HOLOTYPE - AMS I.22916-001, ♂ 29mm SL, Great Barrier Reef, Lizard Island, in lagoon off east tip of Palfrey Island, 4-10m, from seawhip *Junceella fragilis*, quinaldene, H.K. Larson, 10 February 1977. PARATYPES-HAWAII: BPBM 27979, ♂ 32mm SL, Kona, Kamoa Point, 30m, from mooring line, hand, P. Lobel, 6 March 1982; BPBM 29317, 9 spec. 22.5-40.5mm SL, Kona, 30m, from current meter moorings, hand, P. Lobel, 14 October 1982; NTM S. 11082-001, ♂ 40mm SL, same data as preceding; NTM S. 10993-001, 4 spec. 31-36mm SL, Kona, Kamoa Point, 30m, from current meter moorings, hand, P. Lobel, 28 April 1982; USNM 263765, 2 spec. 35-36mm SL, Kona, Kamoa Point, 30m, came up on current meter, P. Lobel, 21 August 1982. MICRONESIA: CAS 50732, 2 spec. 24-26mm SL, Caroline Islands, Palau, Iwayama Bay, shore of south-east peninsula of Koror, 18 October 1955. PHILIPPINES: AMS I. 21913-001, 20 spec. 22-46mm SL, Batangas Province, Anilao Beach, on 20m dropoff, on bamboo fishtrap 1-2m below water surface, D.F. Hoese, 23 April 1980. JAPAN: LICPP 1977050, 3 spec. 14.5-16mm SL, Okinawa, Kuroshima, Ishigaki City, 3 September 1977; LICPP 1980169, 3 spec. 22.5-36mm SL, Japan, Wakayama Prefecture, Kushimoto, Gongen, 24m, from *Ellisella* gorgonian, 24 November 1980. WEST INDIAN OCEAN: ANSP 152965, 19 spec. 12.5-21mm SL, Amirantes Islands, D'Arros Island, off east end of island offshore of Sta. F-87, 6 March 1964; USNM 263766, ♂ 29.5mm SL, Seychelles, near Cerf Island, northeast of Madagascar, 60-70m trawl, 'Anton Bruun' cruise 9, 16 December 1964. WESTERN AUSTRALIA: WAM P. 25109-002, 3 spec. 8.5-15.5mm SL, Dampier Archipelago, Kendrew Island, 1 September 1974. NORTHERN TERRITORY: NTM S. 10018-001, 2 spec. 27-30.5mm SL, Cobourg Peninsula, Coral Bay, 5-6m, from *Junceella fragilis* seawhips, hand, H.K. Larson, 18 October 1981; ANSP 152486, 2 spec. 21.5-26mm SL, Port Essington, Sandy Island Number Two, north end of island on rather open bottom, 10m, from *J. fragilis*, hand, H.K. Larson, 21 October 1981; SMF 19956, ♀ 19mm SL, same data as preceding; NTM S. 10024-001, 3 spec. 26-31mm SL, same data as preceding; NTM S. 10004-030, 8 spec. 13-35.5mm SL, Port Essington, Sandy Island Number Two, 10m, rotenone, H.K. Larson, 21 October 1981. QUEENSLAND: NTM S. 10838-001, 2 spec. 26-30mm SL, Yeppoon, Keppel Bay, 8m, on grey seawhip, N. Coleman, 25 September 1974; AMS I. 22917-001, ♀ 19mm SL, same data as preceding but collected from red *Junceella* sp. whip; AMS I.

24065-001, 3 spec. 33.5-36.5mm SL, reef four and a half miles off Mooloolabah, 23m, from *Ellisella maculata* seawhips, S. Parish, 30 November 1975; CAS 53211, ♂ 26mm SL, Wistari Reef, 30m, from gorgonian whip, N. Coleman, 29 November 1974; AMS I. 22919-001, 4 spec. 16.5-20mm SL, Pandora Reef by Palm Islands, 6m, from *J. fragilis* whips, hand, H.K. Larson, 8 December 1980; AMS I. 22920-001, 3 spec. 16.5-25mm SL, same data as preceding; QM I. 20390, ♀ 20mm SL, same data as preceding; BMNH 1984.10.18.1-2, 2 spec. 20.5-22mm SL, Pandora Reef by Palm Islands, 10m, from *J. fragilis* whip, hand, H.K. Larson, 7 December 1980; MNHN 1984-702, ♂ 24mm SL, east of Hinchinbrook Island, Trunk Reef, 10m, on side of bommie, from *J. sp.* whip, D. Young, 11 September 1977; NMVA A. 3248, 2 spec. 16-20mm SL, Lizard Island, dropoff at North Point, 11-14m, from *J. fragilis* whip, hand, H.K. Larson, 13 February 1975; AMS I. 22925-001, ♂ 26mm SL, Decapolis Reef, reef slope with rubble and gorgonians, 6-12m, from *J. fragilis* seawhip, hand, H.K. Larson, 14 November 1975; AMS I. 22926-001, ♂ 29mm SL, Lizard Island, on steep dropoff halfway between Bird and South Islands, 10-15m, from *J. fragilis* whip, noxfish, H. Larson, 14 February 1977; NTM S. 10837-001, 2 spec. 21-25mm SL, Lizard Island, reef slope between Bird and South Islands, 6-10m, from *J. fragilis*, noxfish, H.K. Larson, 14 February 1977; SAM F. 4737, 2 spec. 18-25.5mm SL, Lizard Island, reef slope between Bird and South Islands, from *J. fragilis* seawhip, 14m, hand, H.K. Larson, 6 February 1977; AMS I. 22927-001, ♂ 24mm SL, Lizard Island, north side Sand Cay, coral boulders on sand, 2-14m, from *J. fragilis* seawhip, hand, H.K. Larson, 9 November 1975; WAM P. 28039-001, 4 spec. 16.5-24.5mm SL, Linnet Reef, 14-15m, scattered coral knolls, from *J. juncea* seawhip, hand, H.K. Larson, 22 November 1975; QM I. 20389, 7 spec. 15-26mm SL, Lizard Island, Sand Cay, 3-24m, reef slope, off *J. juncea* seawhip, rotenone, D.F. Hoese and party, 27 November 1975; AMS I. 22928-001, 2 spec. 17-18mm, SL, Lizard Island, over dropoff north of South Island, 12-15m, from *J. fragilis* seawhip, hand, H.K. Larson, 16 November 1975; BPBM 29312, 4 spec. 16-23.5mm SL, Lizard Island, north side Sand Cay, coral boulders on sand, 2-14m, from *J. fragilis* whip, hand, H.K. Larson, 9 November 1975; ROM 43006, 2 spec. 17.5-22mm SL, Lizard Island, reef slope off Granite Bluff, 12-15m, from *J. fragilis* seawhip, hand, H.K. Larson, 4 November 1975; USNM 261381, 2 spec. 21-23mm SL, same data as preceding; AMS I. 22916-002, 2 spec. 21-23mm SL, same locality as holotype; AMS I. 22929-001, ♀ 23.5mm SL, Decapolis Reef, 10-12m, from *J. fragilis* seawhip, hand, H.K. Larson, 14 November 1975; AMS I. 20990-

003, 26 spec. 15-27mm SL, Decapolis Reef, D.F. Hoese, 2 December 1978; AMS I. 22930-001, ♀ 18mm SL, Decapolis Reef, 10-12m, from *J. juncea*, whip hand, H.K. Larson, 14 November 1975.

Diagnosis. A small goby (up to 46mm SL), somewhat elongated, compressed posteriorly, more rounded anteriorly. Second dorsal rays usually 1,8; anal rays usually 1,8. Pectoral rays usually 15-17, the lowermost 2-4 rays unbranched, and slightly thickened distally. Pelvic fins short and cup-like, skin surrounding pelvic spines thickened and lobed. Gill opening extending ventrally to below pectoral base. Teeth similar in male and female. Mean longitudinal scale count 53, TRB 13.

Segmented caudal rays 16(4), 17(5). Branched caudal rays 11(9). Anal rays unbranched. Gill rakers very short and with fine spines. Lower quarter or less of the first gill arch bound by membrane to opercular wall. Rakers 1+1+4(1), 1+1+5(3), 1+1+6(2), 2+1+4(1), 2+1+5(2), 2+1+6(6), 2+1+7(2)*, 3+1+5(1).

Body somewhat elongate and compressed. Range of morphometrics in Table 5. Body depth at anus 13% (10.4-15.2%) of SL. Large specimens (35-40mm SL) are more robust in appearance, and eyes are slightly smaller in proportion to the body. Head length averages 30% (25.9-34.1%) of SL, and head width greater than head depth. Head depth averages 45% (39.0-52.1%) of head len-

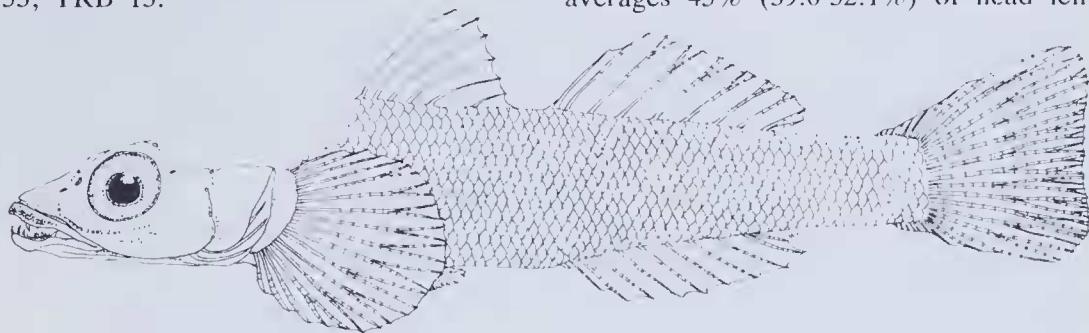


Fig. 5. Holotype of *Bryaninops amphus*, 29mm SL ♂, AMS I.22916-001, from Lizard Island, Qld (colour pattern on body omitted).

Description. First dorsal spines VI (in 146)*; second dorsal 1,6-1,9 (1,8 in holotype). Anal 1,6-1,9 (1,8 in holotype). Pectoral rays 14-17 (16 in holotype). Longitudinal scale count 37-69, with a mean of 53 (57 in holotype). TRB 5-17, with a mean of 13 (15 in holotype).

gth. Head appears roughly triangular in cross-section (apex dorsally). Snout appears rectangular when viewed from above. Gill opening extends a little past pectoral base. Eye 27% (21.4-33.3%) of head length, placed dorsolaterally. Jaws equal, reaching to below anterior

Table 5. Proportional measurements of *Bryaninops amphus* expressed as percentages of standard length (or head length where indicated). N = number of specimens.

	Holotype AMS I. 22916-001	Range	Males Mean	N	Range	Females Mean	N
Standard length	29	20.0-46.0	29.5	38	15.0-40.5	24.9	61
Head length	30.0	26.4-34.1	29.7	38	25.9-32.5	30.6	61
Head depth	13.8	11.9-15.1	13.4	38	11.1-16.2	13.5	61
Head width	17.6	14.8-19.5	17.1	38	15.6-20.0	17.3	61
Body depth at anus	13.4	10.4-15.2	12.8	38	10.9-14.5	12.7	61
Caudal fin length	15.5	15.6-19.5	17.8	36	15.3-20.5	17.9	59
Pectoral fin length	14.8	14.1-17.4	16.4	38	15.0-19.2	17.1	61
Pelvic fin length	12.8	10.5-15.2	13.7	38	9.7-15.0	12.8	61
Snout length (in HL)	33.3	25.6-39.1	31.3	38	23.9-39.2	28.8	61
Eye width (in HL)	27.6	21.4-30.8	26.3	38	22.4-33.3	28.3	61
Upper jaw length (in HL)	40.2	37.2-50.0	44.1	38	25.9-46.7	39.2	61
Interorbital width (in HL)	11.5	8.3-23.4	16.9	38	8.7-21.5	13.6	61
Caudal peduncle length	22.4	16.8-22.8	21.1	38	16.7-22.3	19.8	61
Caudal peduncle depth	7.6	5.4-9.0	8.2	38	6.3-9.1	7.8	61

half of eye. Tongue trilobed, rarely blunt or bilobed.

Lateral line canals of head as in *B. yongei* (Fig. 2). Sensory papillae of head as in Fig. 5. Fleshy suborbital knob absent, occasionally weakly developed (especially in large specimens). Lower preopercular edge smooth, sometimes very slightly indented next to each sensory papilla on lower preopercular limb (comparable to short row of papillae in *B. yongei*). Lower half of opercle not sculptured.

Arrangement of scales on body variable; scales usually extend to behind pectoral fin, leaving area immediately below first dorsal naked, or may reach forward only as far as below fourth dorsal spine. Mid-line of belly, and often sides above belly, naked. Very large specimens (above 35mm SL) may have belly mid-line scaled and sometimes body scales reach to first dorsal origin. Sixteen large specimens (22.5-40.5 mm SL) from 30m depth at Kona, Hawaii, include 1 that has part of and 2 that have the entire belly completely scaled. Twelve of these specimens have rows of scales predorsally, from 2-11 rows present. Four have mid-line of nape naked, with 6-8 rows of scales on either side, extending forward to nearly halfway above the opercle. The largest of 3 (36mm SL) fish from Kushimoto, Japan, has the belly mid-line scaled and a few predorsal scales. Large specimens (22-46 mm SL) from the Philippines have naked napes, with only a few scales over the opercle. Scalation in juveniles reduced, restricted to mid-sides, and may barely reach first dorsal fin.

Pelvic fins short, round and cup-like, 13% (9.7-15.2%) of SL, reaching about halfway to anus. Pelvic spines short and curved inward. Pelvic spine lobes short and fleshy, and may be much-folded. Lobes, frenum (especially) and inner edge of pelvic cup usually finely papillose. Pectoral fins short, rounded reaching to above a short distance past pelvies. Both dorsals and anal fin low, depressed, first dorsal not reaching second dorsal origin. Anal fin rays slightly thickened distally, especially in larger specimens. Most specimens from Kona have 1.9 anal rays. Caudal fin slightly emarginate, upper half of fin slightly longer than lower. All fins

appear proportionately smaller in very large specimens exemplified by 20 specimens averaging 36mm SL taken from a bamboo fishtrap over deep water in the Philippines. These specimens have the caudal truncate to rounded in shape.

Teeth of male and female similar. Three to 5 curved caniniform teeth on each side of anterior half of upper jaw (no large teeth in centre). Behind row of large teeth is a band of roughly 5 rows of small pointed teeth. Lower jaw teeth small and pointed, in a band that widens anteriorly. A large canine on each side of jaw symphysis behind band of fine teeth. A large curved tooth at midside of lower jaw just where lip is expanded and curved slightly upward. Males may have several more large curved teeth along anterior half of lower jaw, and sometimes may have 1 or 2 more upper jaw caniniform teeth than females.

Male genital papilla short, usually slender, flattened, broadest at base. Tip expanded with fine fimbriate lobes, usually with 1 distinct lobe posteriorly. Female genital papilla short and bulbous, with 1 or 2 lobes on either side of opening at tip.

Colour in life. Head and body transparent with bright silvery-white line above vertebral column (Fig. 6). Peritoneum light golden to brown with 2 vertical silvery-white bars usually visible on its side. Lower half of body fawn to golden-brown, or orange or light vermillion. About 6 silvery-white spots show through the body wall along base of anal fin (spots may be partly obscured by lower body colour). Six orange internal bars rise from just below vertebral column to reach dorsal mid-line of body; top of each bar may form a spot on dorsal surface. Vertical bars may be same colour as ventral half of body (e.g. all orange) or form a contrast (e.g. orange bars overlaying gold-brown lower body colour). Pectoral base orange to light brown. Opercle and upper part of preopercle brownish-orange to light vermillion, colour mostly in a stripe across mid-opercle. Gold-brown bar (sometimes indistinct) across top of head behind eyes, and usually some orange and brown

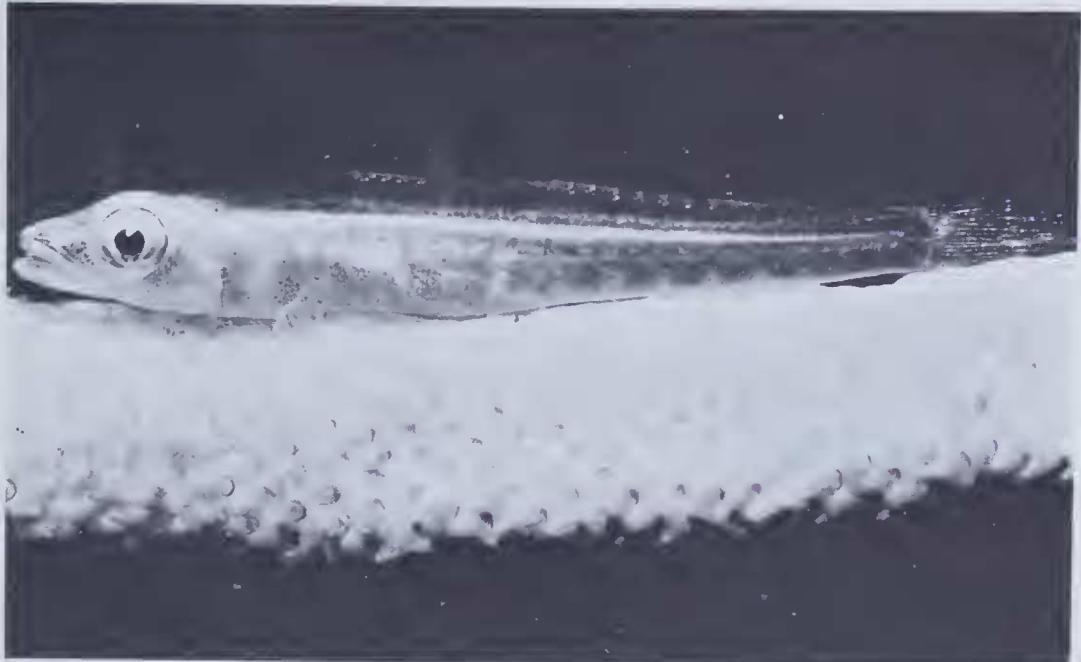


Fig. 6. *Bryaninops amplus* on *Junceella fragilis* at a reef off Hartley's Creek, N. Qld. 5m depth. Photo by Roger Steene.

speckles across interorbit. A distinct orange-red stripe (sometimes pinkish to light purplish) extends from eye to eye around snout, including anterior half of top lip and tip of lower lip. Ventral half of eye may be of same colour as snout stripe. Eye usually bright gold, with thin dark brown rim. Some specimens have gold eye colour overlaid by red to orange, with gold visible only around edge of iris.

Fins except for caudal usually clear. Caudal generally with a narrow basal orange to reddish bar, which may extend onto fin as a ventral streak. Whole caudal in some specimens may be washed with light orange or lilac.

Colour in alcohol. Body wall in preserved material obscures much of colour pattern. Six vertical bars are faintly visible and mid-dorsal spots may show as dusky markings. Brown bar atop head behind eyes often retained as dark mark. Lower half of body often dusky, dark snout stripe and lip markings often remain the most distinctive markings. Fins hyaline, with lower caudal fin streak often just visible.

Large specimens (35-46mm SL) from the Philippines and Hawaii are densely marked, lower half of the body darker

than upper, with diffuse blotch at caudal fin base, usually extending onto fin. Six to 8 dark spots present along dorsal midline from first dorsal fin origin backward, with 12 spots in 2 of the Kona fish. Many of the Philippines specimens with seventh dorsal spot above end of opercle intensified as distinct blotch. In most of the Philippines specimens pectoral base marking very dark, forming a bar. Dorsal surface of snout and sides of head variably dusky in these large specimens.

Comparisons with other species. *Bryaninops amplus* is most similar in general appearance to *B. loki*, *B. yongei* and *B. tigris*. This species was mistakenly identified as *B. yongei* by Burgess and Axelrod (1976). The gill opening extending to below the eye and intense caudal fin marking distinguishes *B. loki* from *B. amplus*. Of the species with narrow gill openings, *B. yongei* differs from *B. amplus* by being stockier, in having the head depth greater than half the head length; in having the lower preopercular border scalloped and grooved, in having definite sexual dimorphism in tooth arrangement, in live colouration, and in host specificity. *B. tigris* differs by having a low pectoral ray count (13 versus 14-17), lower scale

counts, different head shape, in live colouration and in host specificity.

Sixteen of the 17 specimens from Kona, Hawaii, have 1,9 anal rays (as compared with Great Barrier Reef specimens of which 6 out of 85 have anal rays 1,9). The Kona material also differs in tending to develop predorsal scales with increasing size (as may the Japanese population). Specimens from Lizard Island have narrower interorbitals (10% of HL) than those from other localities combined (16% of HL), with Philippines and Northern Territory specimens having the widest interorbitals (19% of HL).

Remarks. *B. amplus* is most often found on the gorgonian seawhips *Junceella fragilis* Ridley and *J. juncea* Pallas. Three *B. amplus* collected off Mooloolah (north of Brisbane) were living on the whip *Ellisella maculata* Studer. The Japanese specimens came from an unidentified *Ellisella* species. *B. amplus* has been collected in Hawaii off a current meter at 15m depth, and off buoy lines at 30m depth. The giant Philippine specimens came from a bamboo fishtrap erected in water over 20m deep.

Junceella fragilis is a common seawhip, often occurring in large groups, at depths of 5-16 metres. *B. amplus* is patchy in distribution, but is often found on sea whips where a constant current is present. Because the whips tend to form groups, there seems to be a looser social structure among *B. amplus* compared to *B. yongei*. Male/female pairs occur on a single whip, but equally as often two adult females, one male and two females (two males and one female in one case) may share a whip. Where the whips are in a group, gobies move freely from whip to whip, darting rapidly across the intervening space. Females often outnumber the males in these large groups, or only one male may be present.

Eggs are laid directly on the living tissue of the whip, in an encircling band about 10-15 cm down from the tip. Newly-settled transparent juveniles (about 10mm long) were observed on Pandora Reef, Queensland, clinging to several whips bearing nest with developing eggs (in December 1980). Juveniles about 10-12mm

long were observed on a mooring line at Kona, Hawaii in December 1981. These were collected in March 1982 and had reached 35mm in length (Phil Lobel, pers. comm.).

Etymology. The Latin '*amplus*', means large, and refers to *B. amplus'* maximum size compared with other *Bryaninops*.

Bryaninops tigris sp. nov.
(Figs 7,8)

Type material. HOLOTYPE - AMS I. 20730-017, ♀ 19.5mm SL, Great Barrier Reef, Lizard Island, on dropoff halfway between Bird and South Islands, from *Antipathes* colony, 18-20m, chemfish, H.K. and J.A. Larson, 3 February 1977. PARATYPES - HAWAII: BPBM 18073, 6 spec. 9-17.5mm SL, Kauai, off Kehaka, off *Antipathes dichotoma* colony, 53m, R. Grigg, December 1974; USNM 261380, 3 spec. 12-19mm SL, same data as preceding. INDIAN OCEAN: ROM 42747, 4 spec. 15.5-16mm SL, Chagos Archipelago, Solomon Islands, dropoff between Isle Diabola and Isle Anglaise, rotenone, R. Winterbottom, A. Emery and party, 18 March 1979. WEST PACIFIC: CAS 36867, ♂ 23mm SL, Gulf of Thailand, Vietnam, off SW tip of Dao Phu-Quoc (Island), Scripps Naga Expedition, 10 February 1961; ROM 42635, 6 spec. 10-14 mm SL, Solomon Islands, Guadalcanal, east side and hold of wreck known as Bonegi I, 12 km west of Honiara, aleuronarians, hydroids, 22m, R. Winterbottom, P. Nichols, D. Evans, R. McKinnon, 15 March 1983. QUEENSLAND, GREAT BARRIER REEF: AMS I. 20730-018, 8 spec. 12-22mm SL, same data as holotype; QM I. 20391, 2 spec. 20-24.5mm SL, Lizard Island, reef slope between Bird and South Islands, from *Antipathes* colony on coral knolls among sand, 18m, hand, H.K. Larson, 1 February 1977; WAM P. 28040-001, ♀ 17mm SL, Lizard Island, dropoff between Bird and South Islands, from *Antipathes* colony, 16-18m, chemfish, H.K. Larson, 2 February 1977; NTM S. 10836-001, 6 spec. 14.5-24.5mm SL, Lizard Island, on dropoff between Bird and South Islands, from *Antipathes* colony on coral rubble, 15-16m, rotenone and hand, H.K. and J.A. Larson, G. Stroud, 5 February 1977; AMS I. 24066-001, 6 spec. 15-20mm SL, Linnet Reef, from *Antipathes* colony, 14-15m, rotenone, H.K. Larson, 22 November 1975.

Diagnosis. A small goby (reaching 25mm SL), with slender compressed body. Second dorsal rays usually 1,8; anal rays usually 1,8-

9. Pectoral rays usually 13 (12-14), with lower 3-4 rays unbranched and thickened distally. Pelvics short and cup-like, skin around pelvic spines and frenum thickened and folded. Gill opening to below pectoral base. Teeth sexually dimorphic. Mean longitudinal scale count 47, mean TRB 10.

Description. First dorsal spines VI (in 35)*; second dorsal I,7-I,8*. Anal I,8-I,9*.

width. Head depth averages 46% (40.4-53.7%) of head length. Snout roughly rectangular to pointed from dorsal view. Snout often slightly concave from side view. Gill opening narrow, to lower edge of pectoral base, occasionally slightly past base. Eye 28% (23.1-31.6%) of head length, placed laterally and high on head. Lower jaw less than upper, not reaching tip of snout.

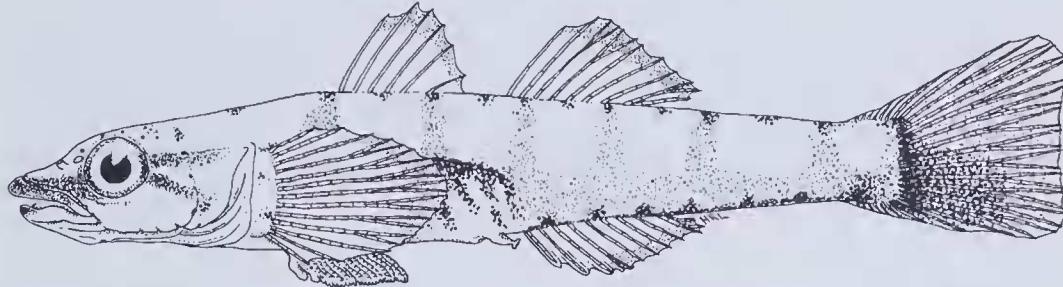


Fig. 7. Paratype of *Bryaninops tigris*, 24.5mm SL ♂, out of QM I. 20391, from Lizard Island, Qld (scales omitted).

Pectoral rays 12-14 (13 in holotype). Longitudinal scale count 32-59, with a mean of 47 (53 in holotype). TRB 8-12, with a mean of 10 (9 in holotype). Segmented caudal rays 16(2), 17(11). Branched caudal rays 10(2), 11(5). Gill rakers very short to rudimentary, with fine spines on rakers. Lower quarter of gill arch bound by membrane. Gill rakers 1+1+5 (4), 1+1+7 (1), 2+1+6 (2).

Body elongate and somewhat compressed (especially posteriorly). Range of morphometrics in Table 6. Some specimens quite slender (BDA 12% of SL), a few appear more robust (BDA 13-14% of SL). Head length averages 29% (26.8-32.5%) of SL, and head depth is about equal to head

Mouth reaches to below anterior half of eye. Tongue bilobed, weakly trilobed or occasionally blunt.

Lateral line canals of head similar to *B. yongei* (Fig. 2), but often with 2 posterior interorbital pores present and interconnecting canal absent (as in all juvenile *Bryaninops*). Sensory papillae similar to *B. yongei* (Fig. 3), lower preopercular edge slightly scalloped as in *B. yongei*, with suborbital and nasal fleshy knobs present (Fig. 7). Series of lower mandibular fleshy knobs often present.

Body scales usually reaching forward to above pectoral base or just over opercular edge, with naked area behind pectoral fin

Table 6. Proportional measurements of *Bryaninops tigris* expressed as percentages of standard length (or head length where indicated). N = number of specimens.

	Holotype AMS I. 20730-017	Range	Males Mean	N	Range	Females Mean	N
Standard length	19.5	14.5-24.5	20.6	10	12.0-20.5	16.1	19
Head length	28.7	26.8-31.3	28.9	10	27.0-32.5	29.2	19
Head depth	13.3	12.1-15.6	13.5	10	11.6-15.1	13.4	19
Head width	12.8	12.1-16.1	14.5	10	11.6-17.3	14.6	19
Body depth at anus	11.8	11.7-14.1	12.6	10	11.6-14.5	12.4	19
Caudal fin length	16.9	11.0-19.8	17.1	10	16.5-20.0	17.4	19
Pectoral fin length	15.9	11.4-21.4	16.4	10	14.2-19.4	16.4	19
Pelvic fin length	12.8	11.8-15.3	13.5	10	11.6-16.0	13.8	19
Snout length (in HL)	28.6	28.8-35.3	32.2	10	25.5-32.1	28.9	19
Eye width (in HL)	28.6	25.0-30.0	26.9	10	23.1-31.6	28.1	19
Upper jaw length (in HL)	37.5	41.2-45.0	42.7	10	34.6-42.6	38.4	19
Interorbital width (in HL)	14.3	11.8-17.5	14.4	10	12.5-19.6	14.6	19
Caudal peduncle length	23.6	20.0-22.9	21.3	10	18.9-24.3	21.3	19
Caudal peduncle depth	6.7	6.4-8.6	7.3	10	5.8-7.5	7.0	19

and anterior half of abdomen. Seales extend across the nape in several Lizard Island specimens so that there may be 1-4 rows of predorsal seales. Body scales reach forward in other specimens (Hawaii and Linnet Reef, Queensland) only as far as fifth dorsal ray or so, with a few isolated seales scattered anteriorly. Mid-line and usually sides of belly naked.

present on side of lower jaw. Males also have rows of small pointed teeth toward front of both jaws, and on sides of jaws are 1 or 2 rows of larger straight sharp teeth. Symphyseal canines on lower jaw often paired. Large outer canines at sides of lower jaw sometimes quite straight, not curved. These canines may be in pairs, threes or singly. Outermost row in upper jaw consists



Fig. 8. *Bryaninops tigris* on *Antipathes* sp. at Lizard Island, Qld. 20m depth. Photo by Roger Steene.

First dorsal fin relatively low, triangular, not reaching second dorsal when depressed. Second dorsal fin high anteriorly, low posteriorly. Anal fin low. Pelvic fins short and cup-like, 14% (11.6-16%) of SL, reaching only halfway to anus. Pelvic spine lobes and frenum fleshy, in some specimens very fleshy, smooth and much-folded. This species does not seem to develop fine papillae on lobes and frenum. Skin at tips of pelvic rays may also be fleshy. Pectoral fins short and rounded, reaching to a point below posteriormost end of depressed dorsal. Caudal fin truncate.

Teeth sexually dimorphic, as in *B. yongei*. Female with rows of fine pointed teeth in both jaws, bands widest at front of jaw. A pair of symphyseal curved canines behind fine-tooth row at front of lower jaw. Outermost row of teeth in upper jaw larger than rest, and in large females these teeth are quite obvious. One or 2 curved teeth usually

of about 12 quite enlarged sharp teeth which may be straight or slightly curved.

Male genital papilla broad and flattened, narrowing below expanded, finely fimbriate tip. Female genital papilla short, round and bulbous, with one pair or many pairs of lobes arranged at tip.

Colour in life. Head and body transparent, with bright white internal line atop vertebral column (Fig. 8). Yellowish tinge over entire body noted on live specimens from Linnet Reef. Lower half of body golden-brown. Peritoneum bright orange to golden-brown, variably overlaid by brown body colour (which may be in the form of roughly square bands). Six or 7 silvery-white spots along base of anal fin, with last spot at base of lower caudal rays. Twelve orange, golden or golden-brown to dark brown spots along middorsal line, spots evenly spaced with first spot midway between first dorsal

origin and posterior edge of eye. Six to 9 orange to light golden-brown internal bars extend from just below vertebral column to reach middorsal spots; bars behind second dorsal fin origin oblique. Pectoral base golden-brown, as is opercle and upper part of preopercle. Bright orange spots and golden-brown blotches across top of head, usually forming 2 irregular lines across nape behind eyes. Golden-brown to dark brown stripe (may be bright orange) around snout tip from eye to eye, stripe may break up behind eye but usually remains as distinct streak across upper part of preopercle and top of opercle. Most of upper lip and tip of lower lip with golden-brown and orange markings as in eye stripe. Eye orange to vermillion, with iris ringed in gold. Small gold-brown blotches may be present at front and back of eye where head stripe touches. Pectorals and pelvics clear. Dorsals with gold spotting, may be submarginal vermillion band present. Anal with scattered gold spots on rays, and vermillion margin. Caudal reddish to light vermillion with yellow margin posteriorly, golden blotches and lighter orange spots may be present basally, forming basal bar. Gold blotches and basal bar may be intensified into distinct dark brown curved blotch.

Colour in alcohol. Much of internal barring obscured by musculature in preservative. The 12 mid-dorsal spots remain intense, as does some brown pigment along lower half of body, especially near anal base. Bar at base of caudal fin distinct. Snout stripe distinct, and extends as dark to dusky streak across top of preopercle and opercle. Blotch on mid-opercle and pectoral base distinct. Caudal fin dusky, often with intense dark blotch. The internal body bars very distinct in many specimens and characteristic.

This species is the most intensely marked (in preservative also) of the *Bryaninops* group. The very large *B. amplus* from the Philippines and Hawaii show similar heavy markings (see remarks under *B. amplus* description) and occasionally show 12 distinct brown mid-dorsal spots and dark caudal bar. However, counts, proportions and physiognomy distinguish the two.

Comparison with other species. *B. tigris* is superficially most similar to *B. loki* in body form and colouration, but can be immediately distinguished by its narrow gill opening (extending forward to under eye in *B. loki*). *B. yongei* shows similarity in live colouration but is much shorter and stockier (BDA 16% of SL versus 12% in *B. tigris*). *B. amplus* is closest in body form and counts, but has a higher pectoral ray count (usually 16-17 versus usually 13), different head shape (in *B. amplus* jaws are equal or with lower jaw slightly protruding; in *B. tigris* lower jaw does not reach tip of upper), different live colouration and different host specificity.

Remarks. Judging from collections, this species is not as abundant as others in the genus, and occurs only on antipatharian corals. The Hawaiian specimens were found clinging to branches of *Antipathes dichotoma* colonies brought up from 53 meters by Rick Grigg. The Great Barrier Reef material was collected from depths of 15-20m, from bush or tree-shaped *Antipathes* colonies. *Antipathes* is often present on deeper reef slopes where a more or less continuous current is present, but most colonies do not support any *Bryaninops*. On more turbid coastal reefs such as Decapolis and Pandora reefs of north Queensland, *Antipathes* may be more abundant, but here *B. tigris* is replaced by *B. loki*.

This fish is one of the most difficult *Bryaninops* to find and collect. The fine brown body bars and yellowish transparent body blend very well with the dark brown branches and yellow to red-brown polyps of the antipatharian, giving the fish superb camouflage protection from predators and collectors. The large golden-red eyes are the only indication that it is a fish and not a row of polyps. *B. tigris* has not been observed to leave the *Antipathes* when under stress; it darts rapidly from branch to branch, usually requiring rotenone or quinaldene for capture. It occurs in groups, with two or three males and several females. Generally, collectors fail to remove all specimens from the *Antipathes*, so sex ratios are not accurate. No nests were observed, and few juveniles collected.

Etymology. The Latin ‘*tigris*’, referring to the fish’s live colour of brown and golden markings, and secretive behaviour.

Bryaninops erythrops
(Jordan and Seale), comb. nov.
 (Fig. 9)

Chaenogobius erythrops Jordan and Seale, 1906: 404.

Type material. HOLOTYPE-USNM 51781, ♂ 12.5mm SL, Samoa.

Additional material. MICRONESIA: NTM S. 10994-001, ♂ 14mm SL, Marshall Islands, Enewetak Atoll, R.S. Nolan, 18 February 1974; AMS I. 18353-033, ♀ 12mm SL, Fiji, Suva, rotenone, B.C. Russell, 12 July 1974; USNM 261370, ♀ 11mm SL, Caroline Islands, Ponape, northeast of Tanak Island, 0-17m, rotenone, V.G. Springer and party, 11 September 1980; USNM 261371, ♀ 12.5mm SL, Caroline Islands, Ponape, reef just south of Param Island, 0-14m, rotenone, V.G. Springer and party, 6 September 1980. PHILIPPINES: USNM 261372, ♀ 13mm SL, Palawan Province, north northeastern side of Bararin Island (Cuyo Island), 17m, rotenone, Smithsonian Institute team, 24 May 1978. INDIAN OCEAN: ROM 42735, ♂ 15mm SL, Chagos Archipelago, Salomon Islands group, in lagoon, 19-22m, corals and hydroids on fine sand bottom, rotenone, A. Emery and party, 16 March 1979; ROM 42734, 7 spec. 8-15.5mm SL, Chagos Archipelago, Salomon Island, north of jetty at Isle Boddam, coral heads in lagoon, 10-15m, rotenone, A. Emery, R. Winterbottom and party, 15 March 1979; ROM 42733, 3 spec. 14-15.5mm SL, Chagos Archipelago, Salomon Island, east of middle of Isle Boddam lagoon, vertical face of bommie, 4-7m, rotenone, A. Emery, R. Winterbottom and party, 13 March 1979. QUEENSLAND, GREAT BARRIER REEF:

one, Australian Museum team, 2 November 1975; QM I. 20393, 4 spec. 6-14mm SL, Lizard Island, west tip of Palfrey Island, reef slope, 5-6m, off spiky *Millepora* colony, quinadene, H.K. Larson, D.F. Hoese, 3 November 1975; AMS I. 24069-001, 14 spec. 9-15mm SL, Lizard Island, off Chinaman’s Head, 3m, from *Porites cylindrica*, noxfish, H.K. Larson, 15 February 1977; AMS I. 24070-001, ♂ 10.5mm SL, Lizard Island, Mrs. Watson’s Bay, 3-5m, off *Porites lutea*, hand, H.K. Larson, 19 November 1975; WAM P. 28038-002, 5 spec. 6-16mm SL, same data as preceding; AMS I. 18739-110, 2 spec. 6-14mm SL, Lizard Island lagoon, south side of Palfrey Island, 3-8m, from *P. lutea* head, rotenone, Australian Museum team, 21 November 1975; NTM S. 10825-001, 8 spec. 9.5-14.5mm SL, Lizard Island lagoon, near South Island, 5-6m, coral knolls and sand, rotenone, J. Paxton, D. Bray and R. Blake, 28 November 1978; AMS I. 24071-001, ♀ 11mm SL, Lizard Island, in lagoon between South and Palfrey Islands, 8m, off *Millepora* colony, quinadene, H.K. Larson, 3 November 1975; ANSP 152485, 6 spec. 9.5-14mm SL, same data as preceding; BPBM 29315, 2 spec. 8.5-14mm SL, Lizard Island, northside of lagoon entrance 2-7m, H. Larson, 11 December 1978; CAS 53208, ♂ 16.5mm SL, Lizard Island, in lagoon off eastern tip of Palfrey Island, 5-10m, off *P. cylindrica* knoll, quinadene, H.K. Larson, 10 February 1977; NTM S. 10834-001, 2 spec. 16.5-17mm SL, Lizard Island, off Chinaman’s Head, 5m, from *Millepora* colony on large bommie, quinadene, H.K. Larson, 12 February 1977; AMS I. 18740-115, ♂ 12mm SL, Yonge Reef, inner reef, 10-12m, from *Millepora*, rotenone, D.F. Hoese, H.K. Larson and party, 8 November 1975.

Diagnosis. A small (up to 18 mm SL) short-bodied species, compressed posteriorly. Eyes large and mostly lateral.

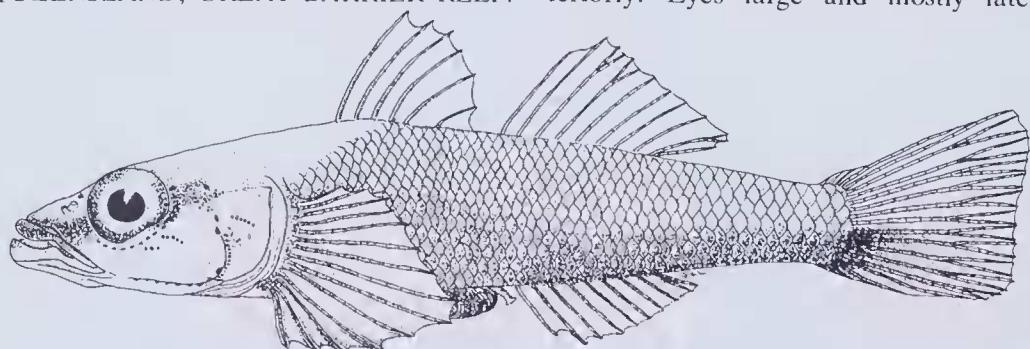


Fig. 9. *Bryaninops erythrops*, 17mm SL ♂, out of NTM S. 10834-001, from Lizard Island, Qld.

AMS I. 18755-129, 18 spec. 13-17mm SL, Lizard Island lagoon, between Palfrey and South Islands, 2-3m, from *Millepora* colony, roten-

Second dorsal rays usually 1,9; anal rays usually 1,8. Pectoral rays usually 14-15, rays nearly always unbranched. Gill opening

wide, reaching to a point below posterior edge of eye. Pelves broad and disc-like, reaching to anus or beyond. Males with conspicuous elongate genital papilla (may equal first few anal rays in height). When live or freshly preserved, ventral half of body dark purplish-brown with internal bars barely visible. Mean longitudinal scale count 40, TRB 9.

Description. First dorsal VI (in 85).^{*} Second dorsal I,7-I,9 (I,8 in holotype). Anal I,7-I,9 (I,8 in holotype). Pectoral rays 13-16 (14 in holotype). Longitudinal scale count 34-49, with a mean of 40 (possibly 38 in holotype; Jordan and Seale give 41 scales in original description, and their illustration agrees). TRB 7-12, with a mean of 9 (10 in holotype). Segmented caudal rays 17 (in 9), branched caudal rays 11 (8). Gill rakers on first arch very short stubs, occasionally anteriormost rakers with few spines. On anterior face of second arch, rakers with spines. Anteriormost part of first arch barely bound by membrane to opercular wall. Rakers 1+1+6 (1), 1+1+8 (2), 1+1+9 (1), 2+1+7 (2), 2+1+8 (1). Holotype vertebrae 10 + 16 = 26.

Body short, roughly triangular in cross-section anteriorly and compressed posteriorly. Head profile rises slightly

33% (27.0-37.2%) of SL, with head width about equal to or slightly greater than to head depth. Eyes large, 32% (25.0-46.3%) of head length, set on sides of head, extending into dorsal profile. Snout short, less than eye, and slightly depressed. Snout rounded in dorsal view with least width just before eyes. Nostrils may be absent (in 19), incompletely developed or only very low rim present (in 15), or present as pair of short tubes (in 6) as in other species. Mouth terminal, very slightly oblique, ending below anterior half of eye. Lower jaw usually protrudes very slightly. Tongue usually distinctly trilobed. Gill opening reaching to point below posterior edge of eye (in 51 including holotype), sometimes further to below posterior half of eye (in 13), or to below mideye (in 4), and occasionally just falls short of eye (in 4).

Lateral line canals of head similar to *B. tigris* in that 2 posterior interorbital pores often present with no interconnecting canal (holotype in this condition). Four specimens with head canals mostly open. Infraorbital pore may be single (in 28), or paired (in 8). Sensory papillae similar to *B. yongei* (Fig.3), but with preorbital and preopercular edges smooth and not scalloped around papillae

Table 7. Proportional measurements of *Brycinops erythrops* expressed as percentages of standard length (or head length where indicated). N = number of specimens.

	Holotype USNM 51781	Range	Males Mean	N	Range	Females Mean	N
Standard length	12.5	10.5-17.0	14.6	24	8.0-15.6	13.2	43
Head length	32.8	31.3-37.2	34.0	24	27.0-37.2	33.4	43
Head depth	15.2	15.3-19.9	16.5	24	13.9-19.7	17.8	43
Head width	20.0	17.4-22.4	19.2	24	17.4-22.7	19.4	43
Body depth at anus	15.2	13.3-21.4	16.0	24	10.4-17.3	15.2	43
Caudal fin length	—	17.5-24.6	20.8	23	15.0-24.4	21.0	40
Pectoral fin length	—	16.2-19.6	17.3	23	11.3-20.7	18.3	43
Pelvic fin length	13.6	13.6-20.0	17.8	24	12.2-22.7	17.6	43
Snout (in HL)	26.8	22.9-30.8	27.6	24	22.2-31.9	27.1	43
Eye width (in HL)	31.7	30.4-34.8	32.6	24	25.0-46.3	34.2	43
Upper jaw length (in HL)	24.4	33.3-44.7	38.6	24	34.0-51.4	39.5	43
Interorbital width (in HL)	12.2	9.6-15.1	12.1	24	8.3-14.6	12.1	43
Caudal peduncle length	25.6	19.3-24.1	22.0	24	15.7-25.5	21.2	43
Caudal peduncle depth	8.0	6.5-9.7	8.5	24	7.3-10.4	8.9	43

obliquely toward dorsal fin origin (Fig. 9). Range of morphometrics in Table 7. Body depth at anus averages 16% (10.4-17.3%) of SL (15.2% in holotype); infrequently, more slender specimens occur (BDA 13% of SL). Head length averages

near ventral preopercular edge, and no suborbital knob.

Body scales usually reach from first few dorsal spines to just above pectoral base, with area behind pectoral fin usually fully scaled. Body in specimens

11mm or less may only be partly scaled, with 1-3 mid-lateral rows extending up to below first dorsal. Mid-line of belly naked. Predorsal scales never present.

First dorsal fin triangular, short, may just reach second dorsal when depressed. Second and third dorsal spines longest, about equal in length. Second dorsal fin short, high anteriorly, low posteriorly. Most (and sometimes all) rays of second dorsal unbranched, usually only tips of second, third and fourth rays branched. Anal fin rays all unbranched. Pelvic fins rather broad and flattened, not generally cup-like, averaging 18% (12.2-22.7%) of SL, and usually reaching to anus. Skin around pelvic spines fleshy, forming flat lobes, which may be finely papillose. Tips of pelvic ray branches may be thickened and finely papillose, or thin and free from any thickening of membrane. Pectoral fins short, rounded or with central rays longest, reaching to below end of first dorsal. Pectoral rays unbranched, except in 4 (out of 11) from the Chagos Archipelago, and 2 (out of 56) from Lizard Island. In these specimens only 1 or 2 rays (6th and 7th counting from below) are branched at the tip. Caudal fin roughly rounded to truncate, upper half of fin sometimes a little longer than lower.

Teeth of males and females similar, curved caniniform teeth a little larger in males. In upper jaw, a band of fine pointed teeth, widest anteriorly. An outer row of 6-8 curved larger teeth across front of upper jaw, posteriormost tooth largest. Lower jaw with similar band of fine pointed teeth, broadest anteriorly. A pair of small canines behind lower jaw symphysis. An outermost row of 6-8 caniniform curved teeth across front of lower jaw, with 1 or 2 larger curved canines before midpoint of side of jaw, where lip is slightly expanded up and outward. The vomerine teeth mentioned by Jordan and Seale (1906) do not exist, the vomer itself curves into the mouth cavity and was apparently mistaken for teeth.

Genital papilla of female short and rounded, with a lobe on each side of opening and 1 or 2 lobes posteriorly. Male genital papilla slender and elongate, broad at base and narrowing to

below tip which is expanded and fimbriate, usually with 1 distinct lobe posteriorly. This papilla is quite well-developed in some specimens and equal to anal rays in height.

Colour in life. Head and body transparent, with white internal pigment over brain and white line along top of vertebral column. Six barely visible reddish-pink internal bars on ventral half of body, mostly obscured by ventral colour. Reddish-brown to violet-brown or purple broad streak covers peritoneum and lower half of body, ending at base of caudal fin. Ventral streak continues forward as a brownish-red colour, across pectoral base and across midside of head to eye. Streak becomes clear crimson in front of eye, and continues around snout and anterior half of upper lip. Lower lip and lower half of head transparent. Eye with broad rim of pink to violet-red, or silvery to pale gold iris. Fins transparent, except caudal, which may have 1 or 2 basal blackish brown blotches extending onto fin.

Colour in alcohol. Dark ventral streak represented in preservative by scattered melanophores, most dense along anal base. Peritoneum remains quite dusky. Narrow line of dark brown pigment always present along base of anal rays, extending along ventral side of caudal peduncle and becoming diffuse at caudal base. Ventral streak often intensified at caudal base to form 1 or 2 dark brown rounded blotches, lowermost of which may extend onto lower half of caudal fin. Melanophores sparsely scattered across pectoral base, often forming thin line at base of rays and on lower half of head. Relatively broad dusky stripe from eye to eye around snout, covering anterior half of upper lip. Tip of lower lip not pigmented. Posterior portion of lower jaw and chin may be speckled with scattered melanophores. Fine light dusky speckling behind eyes and top of head over brain often present. Fins generally unpigmented.

A few melanophores in more heavily-marked specimens present at base of each spine and ray of dorsal fins, pigment on

pectoral base may spread out onto fin membrane and rays, and dark ventral streak seen as dense internal marking in addition to surface melanophores. Most specimens from the Chagos Archipelago with 5 or 6 internal body bars visible through body wall and ventral dusky streak lighter than usual.

Comparison with other species. This species is similar to *B. loki* in possessing a wide gill opening, and the holotype of *B. erythrops* could have been assigned to either species, had it not been illustrated by Jordan and Seale (1906). The type is torn almost in half behind the pectorals and bent backward, with most fin rays missing. However, the original figure shows the characteristic large eyes, short body, unbranched pectoral rays and ventral duskiness of *B. erythrops*. The original description refers to the live colour '..... pearly white above; sides darker and with black points; eye rosy around pupil; rosy longitudinal preocular bars on head.' (Jordan and Seale 1906).

Specimens of *B. erythrops* from the Chagos Archipelago superficially resemble *B. loki* in often having the internal body bars visible (in preservative), and in occasionally having 1 or 2 pectoral rays branched (versus 6 or 7 branched in *T. loki*). The shorter body, long male genital papilla and large pelvic disc reaching the anus are diagnostic.

Remarks. *B. erythrops* occurs on branching forms of the hydrozoan *Millepora* (possibly *M. tortuosa* Dana), and on *Porites* species tentatively identified as *P. lutea* Edwards and Haine and *P. cylindrica* Dana (the latter is a branching species). Most fish from Lizard Island, Queensland, were collected from lagoon areas, from depths of 5-10 metres. The species is not common, although when present on colonies of *Millepora* or *Porites*, they are locally abundant. The reverse countershading makes them difficult to see on the lightcoloured background (yellowish-brown to greenish) although they are occasionally conspicuous. The stony branches make rotenone or quinaldene necessary for capture, but many specimens become lost in crevices. *B. erythrops*

sometimes occurs on *Millepora* with other gobiids, including an undescribed light brown *Pleurosicya* and *Bryaniops ridens* (when live, the latter is similar in colour pattern to *B. erythrops*).

Very little is known about the habits of this species. Fourteen fish collected off a *Porites cylindrica* colony included one male and the rest female (sex reversal probably occurs). Eighteen specimens were collected from a branching *Millepora*, of which six were male, 10 female and one a juvenile. On flat *Millepora* branches, the fish tended to orient vertically, head downward. When feeding, the fish dart out quickly to grab a food item, then return head downward.

Bryaniops natans sp. nov.
(Figs 10-12)

Type material. HOLOTYPE - AMS I. 24067-001, ♂ 18mm SL, Great Barrier Reef, Lizard Island lagoon, by *Acropora* bommie off eastern point of Palfrey Island, 6m, quinaldene, H.K. Larson, 11 February 1977. PARATYPES - COOK ISLANDS: AMS I. 24143-001, 23 spec. 7.5-15.5mm SL, Suvarov Atoll, southeast end in lagoon among *Acropora* heads, 10m, rotenone, B. Goldman, 10 April 1976. MICRONESIA: CAS 36854, 2 spcc. 12-13mm SL, Caroline Islands, Kapingamarangi Atoll, Thokataman, lagoon west of Hukuhenua Islet, coral head, 12 July 1954. PAPUA NEW GUINEA: USNM 261379, ♂ 14mm SL, Hermit Island, north side of west entrance, 0-12m, rotenone, V.G. Springer and party, 4 November 1978. PHILIPPINES: USNM 261377, 10 spec. 10.5-14.5mm SL, Palawan Province, west side of Tagauayan Island, 0-14m, rotenone, Smithsonian team, 24 May 1978; USNM 261376, 4 spcc. 12-13mm SL, Palawan Province, west side of Bararin Island, 0-14m, rotenone, V.G. Springer and party, 23 May 1978; AMS I. 21915-076, 2 spec. 12-15mm SL, Batangas Province, Sombrero Island, 6m, rotenone, D.F. Hoese, 24 April 1980; CAS 53209, 3 spec. 11-14mm SL, Cebu, Mactan Island, off San Carlos Research Station, vertical coral wall, 14-21m, dipnet, D.F. Hoese, 29 April 1980. JAPAN: YCM P. 4612, 2 spec. 15-16mm SL, Okinawa, Ishigaki Island, Kabira Bay, M. Hayashi, 31 July 1978; INDIAN OCEAN: ROM 42743, 8 spec. 11-16.5mm SL, Chagos Archipelago, Peros Banhos Atoll, Isle de Coin, off jetty in lagoon, coral knoll on open bottom, 25m, rotenone, A. Emery, R. Winterbottom and party, 3 March 1979; ROM 42746, 25 spec. 11-17mm SL, Chagos Archipelago, Salomon Island, north of jetty

off Isle Boddam, coral heads over fine sand, 10-15m, rotenone, A. Emery, R. Winterbottom and party, 15 March 1979; ROM 42745, 5 spec. 13-15mm SL, Chagos Archipelago, Salomon Island, in lagoon, to east of middle of Isle Boddam, vertical face of large coral knoll, 4-7m, rotenone, A. Emery, R. Winterbottom and party, 13 March 1979; ROM 42742, 6 spec. 13-15mm SL, Chagos Archipelago, Peros Banhos Atoll, off Isle Anglaise, in lagoon, *Monastrea* and *Acropora* table reef, 5-7m, rotenone, A. Emery and R. Winterbottom, 8 February 1979; ROM 42744, 4 spec. 12-16mm SL, Chagos Archipelago, Peros Banhos Atoll, Isle Anglaise, *Acropora* and *Porites* field in lagoon, 3-10m, rotenone, R. Winterbottom, A. Emery and party, 5 March 1979; ANSP 152487, ♀ 11.5mm SL, Seychelles, Mahe Island, west of northwest tip of Anonyme Island, between Anonyme and Mahe Islands, 11-15m, J. Bohlke, D. Dockins, R. Rosenblatt and W. Starck, 11 February 1964; ANSP 152488, 9 spec. 11-13mm SL, Seychelles, Faon Island, off south shore, 11-14m, J. Bohlke, D. Dockins, R. Rosenblatt, W. Starck and J. Tyler, 29 January 1964. RED SEA: USNM 261375, 10 spec. 15-17mm SL, Gulf

team, 21 November 1975; QM I. 20392, 4 spec. 12.5-15mm SL, Lizard Island, off western tip of Palfrey Island, reef slope, 5-6m, quinaldene, H.K. Larson and D.F. Hoese, 3 November 1975; NTM S. 10835-001, 6 spec. 16.5-19.5mm SL, Lizard Island, in lagoon off eastern tip of Palfrey Island, extensive *Acropora* thickets, 5-6m, noxfish, H.K. Larson, 16 February 1977; AMS I. 20980-007, ♀ 11.5mm SL, Lizard Island, in lagoon by Palfrey Island, 3-4m, coral knolls and sand, rotenone and quinaldene, D.F. Hoese, H.K. Larson, 26 November 1978; AMS I. 24067-002, 2 spec. 15.5-16mm SL, same collection data as holotype; BPBM 29313, ♂ 14mm SL, Yonge Reef, back reef area, 0-13m, hand, R. Kuiter, 26 November 1975; SAM F. 4738, ♀ 14mm SL, Yonge Reef, back reef area, over *Acropora*, 10-13m, rotenone, Australian Museum team, 8 November 1975; NMV A. 3249, ♂ 16mm SL, Tijou Reef, coral bommie and silty sand, 3-13m, Australian Museum and A.I.M.S. team, 23 February 1979; AMS I. 22618-002, 2 spec. 15-16.5mm SL, Escape Reef, lagoon, *Acropora* thickets, 10m, rotenone, D.F. Hoese, November 1981; AMS I. 22581-039, ♀ 13mm SL, North Escape Reef, back reef slope, 10-14m.

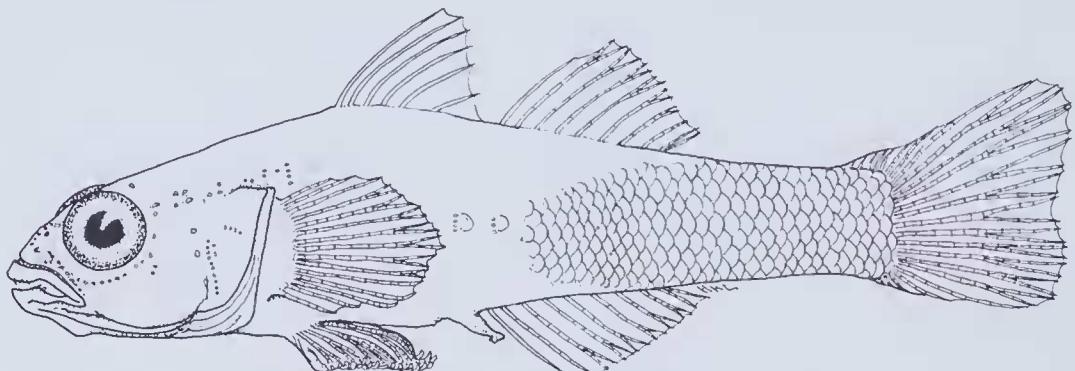


Fig. 10. Paratype of *Bryaninops natans*, 18.5mm SL ♂, out of NTM S. 10835-001, from Lizard Island, Qld.

of Aqaba, bay at El Himeira, 21-27m, rotenone, V.G. Springer, 9 September 1969; WAM P. 28041-001, 8 spec. 14.5-17mm SL; Gulf of Aqaba, bay at El Himeira, 10-12m, rotenone, V.G. Springer, 8 September 1969. WESTERN AUSTRALIA: WAM P. 27666-012, 12 spec. 10.5-17mm SL, Rowley Shoals, Mermaid Reef, centre of lagoon, 15-18m, rotenone, G.R. Allen, 26 July 1982; AMS I. 21316-002, 22 spec. 7-15mm SL, Scott Reef lagoon, large *Acropora* thickets, 7-10m, rotenone, F.H. Talbot, 20 September 1979. QUEENSLAND, GREAT BARRIER REEF: MNHN 1984-703, ♀ 15mm SL, Lizard Island, north-east face, *Stylophora*, 10m, dipnet, D.F. Hoese, 6 November 1975; AMS I. 18739-109, ♂ 11mm SL, Lizard Island, in lagoon by south side of Palfrey Island, 3-7m, rotenone, Australian Museum

coral sand near large coral knoll, rotenone, Australian Museum team, 29 October 1981; BMNH 1984.10.18.3, ♂ 15.5mm SL, Great Barrier Reef, Escape Reef, North Reef, coral knoll in lagoon, 2-11m, rotenone, 6 November 1981.

Additional Material. MNHN 1966-150, ♀ 13mm SL, Gulf of Suez, R. Dollfus, 1928. In very poor condition, therefore not designated as type.

Diagnosis. A small (up to 19mm SL) goby with compressed head and body, with large lateral eyes and short snout. Body only half scaled, small scales extending forward in a narrow wedge to a point below space between dorsal fins. Gill opening wide, to below posterior edge of eye or further. Second dorsal rays

usually I,8; anal usually I,9. Pectoral rays usually 14-16, generally unbranched. Interorbital lateral canals of head always without post-orbital canal connecting posterior interorbital pores (which may be missing). Mean longitudinal scale count 31, TRB 2.

Description. First dorsal IV (in 1), V (3), VI (120)*, VII (1), VIII (1). Second dorsal I,7-I,9 (I,8 in holotype). Anal I,8-I,9*. Pectoral rays 14-17 (15 in holotype). Longitudinal scale count 19-40, with a mean of 31 (29 in holotype). TRB 1-6, with a mean of 2 (1 in holotype), as body only half-scaled. Segmented caudal rays 16(1), 17 (10), branched caudal rays 11 (8). Gill rakers on first arch very short stubs without spines. Rakers on second arch with very fine spines. Anteriormost part of first gill arch barely bound by

HL. Snout short, usually less than eye width, and more or less square in appearance from above. Mouth terminal, slightly oblique, and ending at a point below anterior half of eye. Gill opening reaches to point below posterior edge of eye or a little beyond. Tongue trilobed.

Lateral line canals of head always without canal connecting posterior interorbital pores (Fig. 11). Both anterior and posterior interorbital pores variably developed, often with 1 or the other pair being absent, or the 2 pores close together with papilla between them. Posterior interorbital pore often with this papilla in its centre. Lateral line canal and pore across top of preoperculum sometimes absent. Sensory papillae as in Figs. 10 and 11. Lower preopercular edge and opercle smooth, no scalloping or knobs present.

Table 8. Proportional measurements of *Bryaninops natans* expressed as percentages of standard length (or of head length where indicated) N number of specimens.

	Holotype AMS I 24067-001	Range	Males Mean	N	Range	Females Mean	N
Standard length	18	11.0-19.7	15.2	37	11.0-17.4	13.6	47
Head length	34.4	30.0-36.2	32.5	37	30.0-34.8	32.4	47
Head depth	22.2	18.2-22.5	19.9	36	16.9-26.2	19.5	45
Head width	20.0	15.2-20.0	17.4	37	15.0-20.3	17.4	46
Body depth at anus	22.2	16.4-24.5	20.2	37	16.2-22.3	19.2	47
Caudal fin length	21.1	19.3-24.5	21.7	33	19.3-24.8	21.9	38
Pectoral fin length	18.3	15.2-20.8	18.4	35	14.6-22.7	18.5	47
Pelvic fin length	16.1	13.2-20.8	17.1	37	12.2-21.5	16.6	47
Snout length (in HL)	30.6	20.0-31.0	25.9	37	20.8-29.1	24.9	46
Eye width (in HL)	30.6	30.2-38.5	33.7	37	27.5-38.5	34.2	47
Upper jaw length (in HL)	41.9	36.4-48.7	42.4	37	32.5-47.4	40.7	46
Interorbital width (in HL)	12.9	10.7-23.3	16.5	37	10.5-22.0	16.3	47
Caudal peduncle length	20.0	17.9-25.8	21.8	37	18.4-25.5	22.4	47
Caudal peduncle depth	10.0	7.3-10.6	9.5	37	7.7-10.4	9.2	47

membrane to opercular wall. Rakers 1+1+6 (1), 1+1+7 (1), 2+1+5 (1), 2+1+7 (4), 2+1+8 (1), 3+1+7 (1), 4+1+7 (1), 4+1+8 (1).

Body short and compressed posteriorly, head compressed with eyes lateral. Range of morphometrics in Table 8. Body deepest at first dorsal origin, depth at anus averaging 20% (16.2-24.5%) in SL, 22% in holotype. Head length averages 32% (30.0-36.2%) of SL (34% in holotype), with head depth always greater than head width. Head depth averages 62% (52.4-70.7%) of head length (65% in holotype). Eyes large, averaging 34% (27.5-38.5%) of HL and set laterally, extending into dorsal profile (Fig.10). Interorbital wide, 16% (10.5-23.3%) of

Body naked anteriorly, with small scales reaching forward in narrow wedge on mid-side to a point usually below sixth dorsal spine. Caudal peduncle fully scaled, scales becoming fewer above and below mid-side rows from below end of soft dorsal until only 2 or 3 rows present

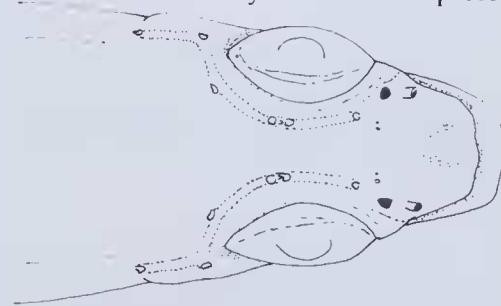


Fig. 11. Head pore pattern of *Bryaninops natans*.

at origin of soft dorsal. A few scales scattered along mid-side of body below first dorsal. A few vertical rows of papillae present on upper body behind pectoral fin (Fig. 10).

First dorsal fin triangular, second and third spines longest and subequal. Second dorsal and anal fins high anteriorly, much lower posteriorly, and short-based (base of second dorsal less than or equal to caudal peduncle length). Second dorsal and anal fins with anteriormost (second to fourth) rays branched, usually in larger specimens. Small fish (11mm or less) with soft dorsal and anal rays generally unbranched. Pelvic fins short, forming shallow cup, averaging 17% (12.2-21.5%) of SL, reaching to anus or beyond. Pelvic spines with fleshy lobes occasionally papillose. Pectoral fins short and rounded, reaching to below end of first dorsal. Pectoral rays unbranched (in 77), or with lowermost 3-7 rays unbranched and next few rays branched at tip (in 31)*. Caudal fin truncate, upper half of fin slightly longer than lower.

across front. An outermost row across front of jaw only of 6-8 large curved teeth, posteriormost tooth generally largest. Lower jaw with 2 or 3 rows of fine pointed teeth, rows usually increase and become irregular towards front of jaw. One or 2 large canines behind these rows, on either side of symphysis. A large curved canine set outside rows of small teeth, a little before mid-side of jaw, where lip is expanded upward.

Genital papilla of female short and bulbous, with extreme tip slightly flattened and forming 4-6 pointed lobes. Male genital papilla elongate, expanded basally and narrowing to tip. Tip expanded into series of fimbriate lobes, with posteriormost lobe longest and non-fimbriate.

Colour in life. Head, body and fins transparent (Fig. 12). Bright chrome yellow overlays pharynx, upper part of gill chamber and most of peritoneum (central quarter transparent) and extends ventrally in a narrowing stripe along anal base to fade out about mid-



Fig. 12. *Brycinops natans* swimming over *Acropora* at Yonge Reef, Qld. Photo by Rudie Kuiter.

Teeth similar between males and females, curved caniniform teeth tending to be somewhat larger in males. Upper jaw with band of fine pointed teeth 2 or 3 rows wide at sides of jaw and 3 or 4 rows wide

point of fin base. Brain and top of anterior half of vertebral column appear whitish. Eye bright violet-red, rimmed with black, a deeper violet-red stripe before and after pupil. Pinkish-red band

crosses over head from posterior edge of eye, and may form irregular faint marblings on nape. Very faint fine red stripe from front of eye around snout above lip, not extending onto lip. Internal bars present (as in other species of the genus), of faint pinkish-red, usually only first 4 bars (very narrow) visible. Second bar (from spiny dorsal origin to behind pectoral fin) is widest. Fish able to intensify or fade internal bars and other pinkish-red markings.

Two freshly dead specimens with lower half of head transparent light reddish or purplish-red: 1 with posterior half of body tinged with very faint pink, the other with posterior half of body (chiefly ventrally) light chrome yellow overlaid by faint reddish tinge. Caudal dull chrome yellow, soft dorsal and anal rays tinged with faint reddish. Live colouration figured in Bemert and Ormond 1981, Fig. 158 (as a larval *Anthias squamipinnis*).

Colour in alcohol. Preserved specimens unmarked hyaline, with black-rimmed iris occasionally preserved as silvery or light violet. Internal bars not visible.

Comparisons with other species. This species is immediately distinguishable from other members of the genus by its compressed head and body, lateral eyes, short snout, and the lateral line canal configuration of the head. Small preserved specimens may resemble *Bryaniops ridens* but are distinguished by jaw shape and teeth and by possessing a wider interorbital.

Remarks. This species is mostly a shallow-water dweller (7-12m), associated with *Acropora* thickets, although specimens from the Gulf of Aqaba were taken from 21-27m depth. I have observed this species most often at Lizard Island lagoon, hovering 30-60cm above *Acropora*, in groups of 8-10 individuals. The fish generally face into the current, sculling with pectorals to keep in place, picking plankton drifting past. They do not cling to the coral although fish have been seen to rest briefly on the tips of the branches, and one observed to nibble and bump at the topmost polyps. If *B. natans* is

chased away from the *Acropora*, it swims back rapidly when about 2m away from the coral. Barry Goldman (pers. comm.) observed large schools of 50-100 individuals hovering over *Acropora* in 13.5 m at Suvarov Atoll, near the Cook Islands.

Etymology. The Latin 'natans' meaning swimming or floating, refers to the species' hovering behaviour, in contrast to the clinging, cryptic habits of other congeners.

Bryaniops loki sp. nov.
(Figs 13,14)

Tenacigobius erythrops (Jordan and Seale) —
Wass 1984.

Tenacigobius sp. 7 — Wass 1984.

Type material. HOLOTYPE - AMS I. 24072-001, ♀ 22.5mm SL, Great Barrier Reef, Lizard Island, on dropoff halfway between Bird and South Islands, from gorgonian fan, 15-16m, rotenone, H.K. and J.A. Larson, G. Stroud, 5 February 1977. PARATYPES - SAMOA: AMS I. 21388-001, ♂ 19.5mm SL, American Samoa, Tutuila, Pago Pago Bay, 25m, from seafan, D. Wass, 24 May 1979; AMS I. 20725-001, 2 spec. 11-18mm SL, American Samoa, Tutuila, Pago Pago Bay, 15-25m, off seawhip, D. Wass, 27 October 1978. NEW CALEDONIA: AMS IB. 5371-74, 4 spec. 15.5-26mm SL, New Caledonia, 25m, from gorgonian. FIJI: NTM S.10832-001, 2 spec. 12.5-15mm SL, SL, Suva, Fish Bench Reef, coral wall, 7-11m, from gorgonian *Ellisella quadrilineata*, hand, H.K. Larson, 31 August 1979; QM I.20395, 2 spec. 10.5-11mm SL, same data as preceding; AMS I. 24076-001, 2 spec. 8-9.5mm SL, same locality as preceding. PHILIPPINES: USNM 265176, ♀ 14mm SL, Palawan Province, Tagauayan Island, west side of Cuyo Island, 0-14m, V. Springer and party, 25 May 1978; USNM 261374, ♂ 15mm SL, Palawan Province, north northeast side of Bararin Island, 0-17m, V. Springer and party, 24 May 1978. PAPUA NEW GUINEA: USNM 261373, ♀ 12.5mm SL, Hermit Island, Amot Island, dropoff on ocean side of reef, 0-45m, V. Springer and party, 31 October 1978. JAPAN: LICPP 1977009, 4 spec. 16.5-20.5mm SL, Okinawa, Kuroshima, 3 September 1977. INDIAN OCEAN: ROM 42739, 3 spec. 16-18mm SL, Chagos Archipelago, Salomon Atoll, between Isle Diabole and Isle Anglaise on dropoff, 20-25m, rotenone, A. Emery, R. Winterbottom and party, 18 March 1979; ROM 42738, 10 spec. 9-19mm SL, Chagos Archipelago, Salomon Atoll, off Isle Poule on dropoff, 33-43m,

rotenone, A. Emery, R. Winterbottom and party, 21 March 1979; ROM 42740, 2 spec. 9-15mm SL, Chagos Archipelago, Salomon Atoll, on dropoff at east tip of Isle de la Passe, ocean side, 18-25m, rotenone, A. Emery, R. Winterbottom and party, 23 March 1979; ROM 42739, ♂ 18m SL, Chagos Archipelago, Salomon Atoll, on dropoff on east side of Isle Poule, 18-25m, rotenone, A. Emery, R. Winterbottom and party, 22 March 1979; ROM 42736, ♂ 17.5mm SL, Chagos Archipelago, Salomon Atoll, northside of Isle Diabole, dropoff, 20-26m, rotenone, R. Winterbottom, A. Emery and party, 17 March 1979; ROM 42741, 2 spec. 10-15mm SL, Chagos Archipelago, Peros Banhos Atoll, off south end of Isle Poule, steep slope and coral outercrop, 30-33m, rotenone, R. Winterbottom, A. Emery and party, 29 March 1979. QUEENSLAND, GREAT BARRIER REEF: QM I. 20394, ♀ 12mm SL, Rib Reef (west of Slasher's Reef), windward side, 15m, off gorgonian fan, hand, H.K. Larson, 4 December 1980; AMS I. 20990-014, 16 spec. 15-22mm SL, Decapolis Reef, 6-12m, coral, rubble and silt, rotenone, D.F. Hoese and party, 2 December 1978; AMS I. 20825-003, 9 spec. 15-23mm SL, Decapolis Reef, off antipatharian, H.K. Larson, 3 December 1978; SAM F. 4739, ♂ 19.5mm SL, Decapolis Reef, coral, gorgonians, silt, 6-12m, off *Ellisella quadrilineata* gorgonian, hand, H.K. Larson, 14 November 1975; SMF 19957, 5 spec. 16-20mm, SL, Decapolis Reef, 10-12m, from gor-

dropoff halfway between Bird and South Islands, 18m, from seafan, rotenone, H.K. Larson, 2 February 1977; CAS 53210, ♀ 17mm SL, Great Barrier Reef, Lizard Island, dropoff halfway between Bird and South Islands, off gorgonian seawhip, 17-18m, rotenone, H.K. Larson, 2 February 1977. LORD HOWE ISLAND: AMS I. 17400-002, 2 spec. 20-22mm SL, 2 miles off east side, rocky reef slope, 45m, quinaldene, G.R. Allen, J.E. Randall and W. Starek, 10 February 1973.

Diagnosis. A small slender goby (to 26mm SL, but usually less), rounded anteriorly and compressed posteriorly. Gill opening wide, usually reaching to below posterior edge of eye. Second dorsal rays usually 1,8; anal rays usually 1,8-9. Pectoral rays usually 14-15, occasionally 16, with lowermost 2-3 rays unbranched and somewhat thickened distally. Pelvics short and cup-like. Most specimens with dark blotch at base of lowermost caudal rays. Mean longitudinal scale count 47, TRB 10.

Description. First dorsal VI (in 96)*; second dorsal 1,7-1,9 (1,8 in holotype). Anal 1,7-1,9 (1,8 in holotype). Pectoral rays 13-17 (15 in holotype). Longitudinal scale count 33-53, with a mean of 47 (50 in holotype). TRB 6-12, with a mean of 10 (11



Fig. 13. Holotype of *Bryaninops loki*, 22.5mm SL ♀, AMS I. 24072-001, from Lizard Island, Qld (colour pattern on body omitted).

gonian *Ctenocella pectinata*, hand, N. Coleman, 14 November 1975; NTM S. 10833-001, ♂ 17.5mm SL, Decapolis Reef, east side, 10m, from gorgonian *Subergorgia suberosa*, quinaldene, H.K. Larson, 17 February 1977; BPBM 29316, 6 spec. 9-20mm SL, Linnet Reef, west side of reef, 6-15m, from gorgonian *Ellisella quadrilineata*, hand, H.K. Larson, 22 November 1975; NMV A. 3250, 5 spec. 8.5-17mm SL, Lizard Island, east side of North Point, 18-21m, from gorgonians *Ctenocella pectinata* and *Junceella geminacea*, hand, H.K. Larson, 28 November 1975; WAM P. 28042-001, 2 spec. 22-23.5 mm SL, same data as holotype; AMS I. 24075-001, 10 spec. 16-20mm SL, Lizard Island,

in holotype). Segmented caudal rays 15(1), 17(8). Branched caudal rays 11(9). Usually posteriormost anal rays branched. Gill rakers on anterior face of first arch very short and smooth. Lowermost quarter or less of first arch bound by membrane to opercular wall. Rakers 1+1+5 (2), 2+1+5 (1), 2+1+6 (2), 1+1+7 (3), 2+1+7 (1), 1+1+8 (1).

Body elongate and rather compressed, body depth at anus averaging 14% (10.5-17.8%) of SL (Fig. 13). Range of morphometrics in Table 9. Head length averages

Table 9. Proportional measurements of *Bryainops loki* expressed as percentages of standard length (or head length where indicated). N = number of specimens.

	Holotype AMS I. 24072-001	Range	Males Mean	N	Range	Females Mean	N
Standard length	22.5	11.0-26.0	18.4	30	9.5-24.5	16.5	46
Head length	30.5	25.7-34.5	31.1	30	20.7-35.0	30.9	46
Head depth	14.6	11.2-17.3	14.4	29	11.5-17.5	14.9	46
Head width	15.0	10.9-20.9	15.9	29	12.0-19.1	15.9	46
Body depth at anus	13.7	10.9-16.2	13.4	30	10.5-17.8	13.8	46
Caudal fin length	17.7	17.4-22.8	19.7	28	17.5-23.3	19.4	39
Pectoral fin length	15.5	15.4-22.5	17.8	29	13.3-22.5	17.6	44
Pelvic fin length	11.9	11.4-18.7	13.6	27	11.0-18.2	13.2	42
Snout length (in HL)	29.0	24.1-37.0	28.9	30	21.1-41.9	26.6	46
Eye width (in HL)	26.1	27.3-36.4	30.0	30	25.8-38.7	31.0	46
Upper jaw length (in HL)	37.7	33.3-51.9	40.4	30	34.0-54.8	39.6	46
Interorbital width (in HL)	8.7	5.6-16.1	10.0	30	5.2-17.0	9.9	46
Caudal peduncle length	22.1	18.2-24.4	21.6	30	16.1-28.0	21.6	46
Caudal peduncle depth	7.5	6.4-10.3	8.3	30	6.0-9.4	7.8	46

31% (20.7-35.0%) of SL, with head width roughly equal to head depth. Head appears more or less square in cross-section. Head depth averages 47.5% (36.5-52.6%) of head length. Eyes large, placed laterally and entering dorsal profile, averaging 31% (25.8-38.7%) of head length. Snout short, usually equal to or less than eye, and roughly rectangular from dorsal view. Profile of snout often concave before eyes. Jaws terminal, slightly oblique and ending at a point below anterior half of eye. In some specimens (from Chagos Archipelago and Lizard Island), upper jaw is slightly longer than lower (as in *B. tigris*). Tongue trilobed. Gill opening wide, usually (in 65 specimens) reaching to below posterior edge of eye. In 31 specimens, mostly from Lizard Island and Chagos Archipelago, the gill opening reaches forward past posterior edge of preopercle but does not reach eye. Lateral line canals of head as in *B. yongei* (Fig. 2). Sensory papillae as in Fig. 13, with only single row of papillae along lower preopercular edge, which is always smooth, not scalloped. Small fleshy knob sometimes slightly developed on preorbital edge.

Scales on body extend to behind pectoral fin, usually to just above pectoral base, leaving head, belly and pectoral base naked. Specimens 12mm SL or less may have scales extending to below end of first dorsal fin, and only 1 or 2 rows of scales along mid side of body.

Pelvic fins short, round and generally cup-like, averaging 13.5% (11.0-18.7%) of SL, not reaching anus. Pelvic spine lobes

short and fleshy. Inner edge of pelvic cup may be finely papillose. Pectoral fins short and rounded, do not reach past end of pelvics. First dorsal fin triangular, second dorsal fin equal to first dorsal height anteriorly, low posteriorly. Anal fin low, higher anteriorly. Caudal fin truncate, with upper half of fin slightly longer than lower.

Teeth dissimilar between male and female. Rows of fine pointed teeth in lower jaw that are a little larger in males. A pair of canines on either side of mandibular symphysis; these are large in males, and in females may only be represented by 1 canine on either side of symphysis. One or 2 curved caniniform teeth at mid-sides of jaw. Upper jaw teeth fine, pointed, in several rows, widest anteriorly. Outermost row of about 12 enlarged teeth across front of jaw in males, with small gap at centre of jaw. Outermost row teeth smaller in females, and may be fewer.

Female genital papilla short and bulbous, with about 8 short lobes around opening. Male papilla somewhat elongate and flattened, broad at base and narrowing to expanded tip. Tip finely fimbriate, may be expanded into 2 fimbriate rounded lobes with a longer smooth lobe posteriorly.

Colour in life. Head and body transparent (Fig. 14). Brain covered with whitish to pale gold pigment. Bright white line from base of skull extends along top of vertebral column to base of caudal. Lower half of body with 7 internal,



Fig. 14. *Bryaninops loki* on an unidentified gorgonian at Michaelmas Reef, Qld, 15m depth. Photo by Roger Steene.

broad, red-brown bars extending to just above vertebral column, narrowing rapidly toward midside of body. Anterior-most bar often continues as narrow band to reach anterior base of spiny dorsal, as do next 3 or 4 bars in varying degrees. Peritoneum silvery to light golden, overlaid with dark brown speckles. Opercle and upper half of preopercle orange to red-brown. Nape behind eyes with irregular clusters of orange, golden and brown speckles (which may form bands or spots). Red to orange or violet-red stripe extends from eye around snout and upper lip, tip of lower lip usually included in stripe. Iris golden around pupil, remainder of iris red-gold to violet, with rim dusted with dark brown. First dorsal clear with irregular blotch of orange and brown speckles at base of anterior-most spine. Second dorsal often with similar markings. Other fins clear except caudal. Caudal transparent on upper quarter, lower three-quarters of fin red-brown as in body bars. Dense black spot at lower fin base, spot may extend out to end of fin or may be faint. Some fish collected on orange, beige or pinkish gorgonians may have dark brown pigments replaced by orange and pink.

Colour in alcohol. Most of pattern ob-

cured in preservative. Body bars show (in varying degrees) through body musculature, and may be distinct. Dark blotch on lower caudal base usually remains, but may be reduced in size. Stripe around snout and upper lip often distinct, most intense across upper lip. Dusky blotches and specklings on nape behind eyes and sides of head usually present. Many specimens from Chagos Archipelago have nape, bases of dorsal fins and posterior half of body dusted with light brown pigment spots on skin surface. Internal body bars visible only in a few of these specimens. This pattern also appears in some adults from Lizard Island and 10 to 11mm SL juvenile specimens from Fiji, but in 14 to 15mm Fiji specimens surface specklings are fewer, with the internal bars beginning to show through musculature.

Comparisons with other species. *B. loki* is similar in appearance to *B. tigris*, but the latter has a restricted gill opening and low pectoral ray count (13 in *tigris*, 14-16 in *loki*). They are difficult to separate when live, as *B. tigris* often has a dark vertical bar or blotch at caudal fin base, and the basic colouring is the same. The narrow internal bars and dorsal spots of *B. tigris* are diagnostic. Some Lizard Island specimens of *B. loki* may have a

narrower gill opening (extending forward only to below preopercular angle) and resemble *B. tigris* (which has gill opening extending only to ventral border of pectoral base). The latter species is more slender (BDA averaging 12% of SL versus *B. loki* BDA averaging 14% of SL).

Ten poorly preserved *Bryaninops* (ZIM 5586) trawled off the Gulf of Aden are probably of this species. Eight of them have 16 pectoral rays, which is high for *T. loki*.

Remarks. This species is most often found on gorgonian seafans and whips, but is not commonly seen. It has been collected on the Great Barrier Reef from the whips *Ctenocella pectinata* Pallas, *Junceella gemmacea* (Valenciennes), *Ellisella quadrilinata* (Simpson), the fan *Subergorgia suberosa* Pallas, and black coral, *Antipathes* sp. at depths of 6-45m. The species seems to prefer branched gorgonians, unlike *B. amplus*. *B. loki* may be found on coastal turbid reefs of Queensland, where *Antipathes* colonies occur, replac-

were 8 and 9.5mm long. One nest was observed on a red *Ellisella*-like whip, with the eggs rather widely scattered (Roger Steene, pers. comm.).

Etymology. The name *loki* refers to the legendary Old Norse god Loki, who was a rather enigmatic trickster.

Bryaninops dianneae sp. nov.

(Fig. 15)

Type material. HOLOTYPE-AMS I. 24073-001, ♂ 20mm SL, Fiji, Mamanutha Group west of Viti Levu, Malololailai, reef lagoon, off green sponge, 7.5m, hand, D. Bray and R. Blake, 31 March 1980. PARATYPE-AMS I. 24073-002, ♀ 19mm SL, same data as holotype.

Diagnosis. A small slender goby with a long depressed head. Second dorsal rays 1,8; anal rays 1,9. Pectoral rays 15-16, with lower 2-3 rays unbranched and somewhat thickened distally. Pelvics broad and flat, reaching past anus. Frenum smooth, without anteriorly-facing pocket. Gill opening reaches to just behind eye. Longitudinal scale count 50-54, TRB 10-11.

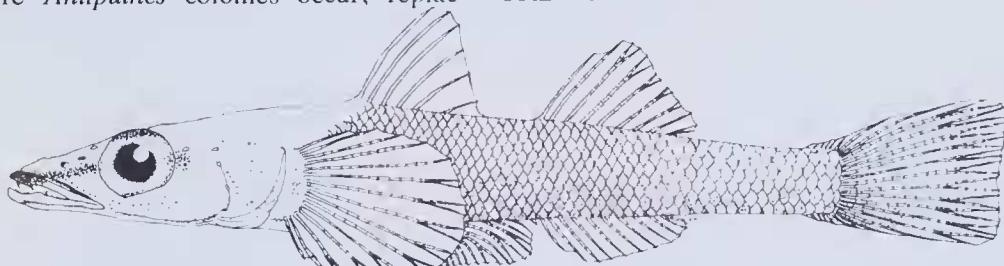


Fig. 15. Holotype of *Bryaninops dianneae*, 20mm SL ♂. AMS I. 24073-001, from Fiji.

ing *B. tigris* in this habitat. They are difficult to collect, as they move rapidly from branch to branch of the gorgonian, and on sea fans, where there are innumerable holes, the fish slip through easily from one side to the other. This species is cryptically coloured and often difficult to see, as the colour pattern matches that of the host invertebrate.

B. loki occurs in small groups. One or two males will be present, and three to 10 females. The two males usually are similar in size, but are not always the largest fish present. They may be in pairs or threes on unbranched whips. One of three small females, from an *Ellisella* whip from Fiji, possessed an elongate genital papilla and may have been changing sex. The smallest juveniles settled on a whip

Description. First dorsal spines VI*; second 1,8*. Anal 1,9*. Pectoral rays 15* and 16. Longitudinal scale count 50 and 54*. TRB 10 and 11*. Segmented caudal rays 17*, branched caudal rays 11*. Anal rays unbranched. Gill rakers short and slender, those on anterior face of first arch smooth, rakers on anterior face of second arch with fine spines. Raker count of paratype 2+1+9. Lower quarter of first gill arch bound by membrane to opercular wall.

Body slender, elongate and rather compressed. Morphometrics in Table 10. BDA 12.5% of SL in holotype, 12% in paratype. Head length 34.5% of SL in holotype, 36.3% in paratype. Head width much greater than head depth, depth 37.7% of head length. Eyes large, placed

Table 10. Proportional measurements of *Bryaninops dianae* expressed as percentages of standard length (or head length where indicated).

	Holotype	Paratype
Standard length	20	19
Head length	34.5	36.3
Head depth (in HL)	37.7	37.7
Head width (in HL)	58.0	55.1
Body depth at anus	12.5	12.1
Caudal fin length	20.5	22.1
Pectoral fin length	18.5	19.5
Pelvic fin length	25.0	27.4
Snout length (in HL)	33.3	31.9
Eye width (in HL)	29.0	29.0
Upper jaw length (in HL)	37.7	39.1
Interorbital width (in HL)	10.1	7.2
Caudal peduncle length	20.0	20.0
Caudal peduncle depth	8.5	8.4

dorsolaterally and entering dorsal profile, 29%* of head length. Snout rather long and depressed, 31.9% of head length in paratype, 33.3% in holotype. Snout somewhat rectangular from dorsal view. Jaws terminal, slightly oblique and ending at a point below anterior margin of pupil or a little further forward. Middle of sides of lower jaw curved slightly upward at site of large curved teeth. Tongue trilobed. Gill opening reaching forward nearly to posterior margin of eye. Lateral line canals of head as in *B. yongei*. Sensory papillae as in Fig. 15. Lower preopercular and preorbital edges smooth, with no suborbital knob or scalloping.

Scales on body extend up to behind pectoral fins and to just above pectoral base. In holotype, scales extend along first dorsal base to below anteriormost spine. In paratype, scales along dorsal surface reach to below sixth dorsal spine, leaving a naked strip below first dorsal fin. Breast and belly naked.

Pelvic fins large, flat and rounded, reaching past anus but not to anal fin. Pelvics 25% of SL in holotype, 27.4% in paratype. Fin membranes thin, not fleshy or papillose. Pelvic spines straight, lobes rounded and flattened, smoothly fused to frenum which is not folded forward to form anteriorly-facing pocket (as in all other *Bryaninops* species). Pectoral fins

rounded, reaching to above anus. First dorsal fin triangular, higher than greatest body depth in male. Second dorsal fin nearly equal to first in height anteriorly, very low posteriorly. Anal fin low. Caudal fin truncate.

Teeth similar in both sexes, although caniniform teeth are rather larger in the male. Rows of small fine upright teeth across front of lower jaw narrowing to 2 or 3 rows along sides of jaw. One of these rows is of distinctly larger upright teeth. A pair of large curved teeth on either side of mandibular symphysis behind rows of front teeth. Large curved teeth near mid-sides of jaw (single teeth in female; paired in male) positioned just outside tooth rows. Upper jaw with rows of small fine teeth, widest anteriorly, with small gap at centre front. An outermost row of 6-8 large curved teeth across front of jaw, 3 or 4 teeth on either side of gap. The 2 posteriormost (and largest) teeth on each side tend to protrude over lower lip when jaws closed.

Genital papilla of male short, with finely fimbriate tip barely expanded. Genital papilla of female small, bulbous, with several short lobes at tip.

Colour in alcohol. No live colour notes available. Preserved, head and upper half of body mostly pale. Lower half of body from behind upper pectoral base to

caudal base dusky (as in *B. erythrops*), colouration extending onto caudal fin as a streak or blotch. Pectoral base dusky or with several large dusky blotches. Nape with large brown blotch behind each eye, and scattered smaller spots toward interorbital. Dark stripe from eye to eye around snout and front of upper lip. Faint dusky specklings on edge of lower lip. Opercle and upper preopercle with scattered dark speckles, some forming irregular lines. Scattered dusky spots below dorsal fin bases. All fins transparent.

Comparison with other species. Although only 2 specimens of *B. dianneae* are available, they are immediately distinguishable from other *Bryaninops* species by the smooth frenum and flat pelvic spine lobes. The pelvic fin itself is larger, flattened (not cuplike) and the skin is not thickened or papillose. The long depressed head and very slender body of *B. dianneae* gives a resemblance to the sponge goby, *Luposicya lupus*, a species in which the pelvic frenum is not always folded forward. *Luposicya* is distinct in possessing rows of long horizontal teeth in the lower jaw, among other characters.

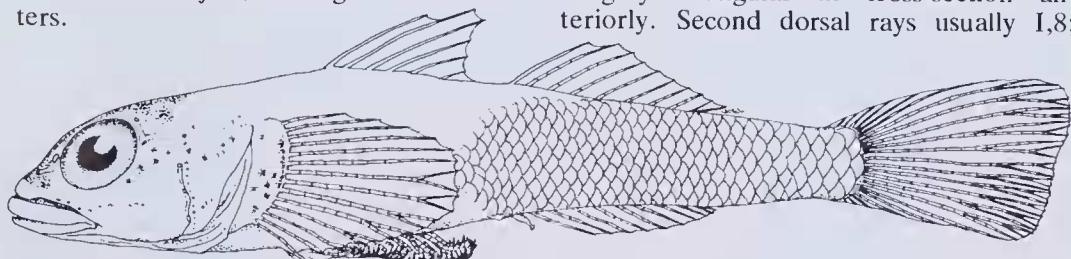


Fig. 16. *Bryaninops ridens*, 15mm SL ♂, out of AMS I.19473-187, from Lizard Island, Qld.

Remarks. This species was collected from 'a green sponge' at 7m depth in a reef lagoon at Malololailai, Fiji.

Etymology. The species is named for Dianne Bray, of the Australian Museum, who collected the only known specimens.

***Bryaninops ridens* Smith
(Fig. 16)**

Bryaninops ridens Smith, 1959:216.

Lobulogobius bentuviai Goren, 1984:78-80. Syn. nov.

Type material. HOLOTYPE-RUSI 225, ♀ 15.8mm SL, Pinda, Mozambique, 21 September 1956.

Additional material. RED SEA: P.6477 (Holotype of *Lobulogobius bentuviai* Goren), ♂ 14.5mm SL, South Sinai Peninsula, Marsa Bareka, 16 Oct 1979; P.6419 (Paratypes of *L. bentuviai* Goren), 5 spec. 9-13mm SL, same data as preceding. WEST INDIAN OCEAN: RUSI 5442, 2 spec. 14.5-16mm SL, Mozambique, Pinda ; ANSP 153848, 7 spec. 11-14.5mm SL, Amirantes Islands, D'Arros Island, 5 March 1964. CHAGOS ARCHIPELAGO: ROM 46699, ♀ 12mm SL, Great Chagos Bank, Eagle Island reef off north tip, 25 February 1979; ROM 46698, ♀ 10mm SL, Great Chagos Bank, Eagle Island lagoon, 25 February 1979. CAROLINE ISLANDS: CAS 56380, 2 spec. 13-13.5mm SL, Ulithi, outer reef off Sorlen Island, 22 September 1956; USNM 269838, 2 spec. 9-11.5mm SL, Ponape, inside barrier reef at north end of island, 14 September 1980. MARSHALL ISLANDS: AMS I.25300-001, ♀ 12mm SL, Eniwetok, reef 9. QUEENSLAND, GREAT BARRIER REEF: AMS I.19473-187, 8 spec. 12-14mm SL, Lizard Island, south end of Coconut Beach, off large *Porites* knoll, 24 November 1975; NTM S.11560-001, 2 spec. 13.5-14mm SL, Lizard Island, between Bird and South Island, off *Millepora* sp., 8 Feb 1977; AMS I.22579-067, ♂ 15.5mm SL, Escape Reef.

Diagnosis. A very small goby (up to 16mm SL), compressed posteriorly and roughly triangular in cross-section anteriorly. Second dorsal rays usually I,8;

anal rays I,8. Pectoral rays usually 13-14, the lowermost 2-3 rays unbranched and somewhat thickened distally. Pelvic fins short, forming a round cup, skin surrounding pelvic spines somewhat thickened, forming flat rounded lobe. Gill opening variable, may extend from below posterior preopercular edge to just rear posterior edge of eye. Teeth similar in male and female. No canine at side of lower jaw. Body naked anteriorly. Mean longitudinal scale count 33, TRB 8.

Description. First dorsal VI (in 20)*, VII (in 1); second dorsal I,7 (in 1), I,8 (in 22)*.

Anal 1,8*. Pectoral rays 13-15, (14 in holotype) with lower 2-3 rays unbranched. Longitudinal scale count 25-37, with a mean of 33*. TRB 4-10, with a mean of 8 (5 in holotype). Anal rays unbranched. Second dorsal with only first 2-4 rays branched. Segmented caudal rays 17 (4)*. Branched caudal rays 11(1), 12(2). Gill rakers very short thin pointed stubs with spines only on posterior rakers. Lower quarter or less of first gill arch bound to opercular wall by membrane. Rakers 1+1+4(1), 1+1+5(1). Vertebrae 10+15 (plus urostyle) = 26(1).

Scales small, reaching anteriorly usually to below sixth dorsal spine, with naked strip along anterior halves of bases of second dorsal and anal fins. Two or 3 isolated scales usually present on mid-line of side below first dorsal fin. Belly always naked.

Pelvic fins short, round and cup-like, 19% (16.3-22.1%) of SL, reaching about halfway (or further) to anus (just reaches anus in 16mm SL specimen). Pelvic spines very short, straight, or slightly curved inward. Pelvic spine lobes generally flat and rounded, occasionally

Table 11. Proportional measurements of *Brycinops rubens* expressed as percentages of standard length (or length where indicated). N = number of specimens.

	Holotype RUSI 225	Range	Males Mean	N	Range	Females Mean	N
Standard length	15.5	11.5-15.5	13.6	11	12.0-16.0	13.6	11
Head length	28.4	29.6-33.8	31.1	11	27.5-32.5	30.2	11
Head depth	16.8	15.4-18.3	16.7	11	15.8-20.0	17.2	11
Head width	19.4	19.2-22.8	20.8	11	15.6-22.1	20.5	11
Body depth at anus	18.7	13.0-15.9	15.2	11	14.1-16.6	15.3	10
Caudal fin length	—	19.1-22.8	20.5	9	20.0-21.5	20.7	8
Pectoral fin length	17.4	17.4-22.2	20.2	10	17.5-21.4	19.2	10
Pelvic fin length	18.7	16.3-22.1	19.1	11	17.5-20.8	18.9	11
Snout length (in HL)	29.5	24.4-30.0	26.0	11	23.8-28.6	25.8	11
Eye width (in HL)	31.8	29.3-34.0	31.8	11	30.2-36.4	33.2	11
Upper jaw length (in HL)	47.7	40.8-47.7	44.5	11	41.0-48.8	45.1	11
Interorbital width (in HL)	11.4	6.8-13.6	11.9	11	8.5-14.3	11.5	11
Caudal peduncle length	22.6	20.0-23.2	21.2	11	20.7-24.3	22.1	10
Caudal peduncle depth	8.4	7.8-10.0	8.9	11	8.1-10.0	8.9	10

Body short, slender, compressed, more rounded anteriorly. Range of morphometrics in Table 11. Body depth at anus averages 15% (13.0-16.6%) of SL. Head length averages 30.7% (27.5-33.8%) of SL, head width greater than depth. Head in cross-section roughly triangular, apex dorsally. Snout short and rounded in dorsal view, 26% (23.8-30.0%) of HL. Eye 32.5% (29.3-36.4%) of head length, placed dorsolaterally. Jaws reach to below mid-eye or to anterior half of eye. Mouth terminal, with jaws, especially lower, curved upward anteriorly. In ventral view, lower jaw triangular. Tongue short, usually blunt, occasionally trilobed (in 9 males and 3 females). Lateral line canals of head as in *B. yongei* (Fig. 2). Sensory papillae of head as in Fig. 16. Suborbital smooth, with no fleshy knob. Lower preopercular edge smooth; lower half of opercle not sculptured.

fleshy and folded. Lobes, frenum and inner edge of pelvic cup finely papillose or quite smooth. Pectoral fins short, slightly pointed, reaching to above pelvic fin tips or little beyond. Lower unbranched ray tips not especially thickened. Both dorsals and anal fin low; depressed first dorsal not reaching second dorsal origin. First dorsal fin triangular. Anteriormost anal fin rays occasionally slightly thickened at tips. Caudal fin rounded to truncate, with upper half of fin slightly longer than lower.

Teeth of males and females similar. In upper jaw, 3 or 4 curved canines across front of jaw, with gap in centre; canines usually larger in males. Behind canines, 2 or 3 crowded rows of small fine pointed teeth, which tend to be curved anteriorly and usually straight and even in height at side of jaw. Lower jaw with 4 or 5 crowded rows of small fine pointed teeth forming a wide band anteriorly, narrowing at sides

of jaw to 2 or 3 even rows; teeth in outermost row tend to be straight and angled outward. Teeth in innermost row slightly larger and usually straight. One or 2 large curved canines on each side of jaw symphysis, behind band of fine teeth. One or 2 smaller canines may be present anterior to symphyseal pair, at outer edge of band of fine teeth (usually in males).

Males genital papilla short, flattened and broad at base, abruptly narrowing to slightly expanded tip. Tip with a pair of several fine lobes. Female genital papilla short and bulbous, often with many fimbriate lobes around opening at tip, or several pairs of lobes near each end of opening.

Colour in life. Translucent pale grey-green, with no dark markings on any fins. Eyes red, with red line from eye to eye around nostrils across snout. Upper lip red. Two faint red streaks from each eye backward past opercle. No dark internal bars.

In an underwater photograph of a *Bryaninops* (on vertically-lobed *Millepora* sp.) which is probably *B. ridens*: body transparent, with golden peritoneum and gold-brown colour over vertebral column partly showing through body wall. Head translucent, pearly blue-grey, with broad gold-brown patch overlaying brain and nape. Similarly coloured stripe barely visible, extending from eye to eye around snout. Eyes silver, with dark gold-brown rims.

Colour in alcohol. Very little pigment pattern discernable in most specimens. Body generally colourless but for scattered dusky speckling on lower half of body (posterior half usually). Occasionally scale margins on lower sides thinly outlined. No vertical bars visible. Most distinct marking is dense scattering of melanophores over brain, usually forming distinct blotch behind each eye, with a pigment-free line down dorsal mid-line of nape. Slightly smaller melanophores extend down interorbital space onto snout and upper lip, forming two indistinct stripes, with generally unpigmented area on centre of snout. Lip of lower jaw may be dusky. Fins usually unpigmented, with

some speckling along bases of dorsals and some irregular fine speckling along rays and lower halves of fins. Pectoral base may have dense blotch of melanophores or with light sprinkling only. Caudal evenly dusky in some specimens.

Comparison with other species. *B. ridens* differs from all other *Bryaninops* other than *B. isis* in not possessing a large curved canine on each side of the lower jaw and in the characters discussed in the Introduction. *B. ridens* differs from *B. isis* in having the body only partly scaled (24-37 lateral scales, 34-51 in *isis*); the interorbital is narrower (11-12% of HL in *ridens*, 16-17% in *isis*); the snout tends to be shorter and more rounded (26% of HL in *ridens*, 30% in *isis*); and in colour pattern and host specificity.

The 6 Red Sea specimens all had pectoral ray counts of 13, but did not differ otherwise.

Remarks. This species is not common, and despite the collecting effort that has taken place in the widely spread localities from which it is known, relatively few specimens have been obtained. At Lizard Island, Queensland, eight were rotenoned from a large *Porites* knoll, and two collected from a branching *Millepora* (*tenella*?). Other collections in which *B. ridens* occurred were rotenone stations with no host mentioned.

Bryaninops isis sp. nov. (Fig. 17)

Type material. HOLOTYPE-AMS I. 25301-001, 19.5mm SL ♂ Great Barrier Reef, Lizard Island, east side of Palfrey Island, 3-5m, from gorgonian *Isis hippuris*, hand, H.K. Larson, 1 February 1977. PARATYPES-PHILIPPINES USNM 269837, 2 spec. 14.5-16.5mm SL, Palawan Province, west side of Tagauayan Island, 0-14m, V. Springer et.al., 25 May 1978. PAPUA NEW GUINEA: USNM 269836, 7 spec. 14-18mm SL, Hermit Island, north side of west entrance 12m, V. Springer et.al., 4 November 1978. QUEENSLAND, GREAT BARRIER REEF: AMS I.22633-095, 2 spec. 13-14mm SL, Escape Reef, Australian Museum party; ANSP 153847, 2 spec. 16.5-18.5mm SL, Endeavour Reef, northwest of Cook wreck site, 2-5m, J. Tyler et.al., 16 January 1969; AMS I.25302-001, ♀ 11mm SL, east side of Rib Reef, 9m, H.K. Larson, from *Isis hippuris*, 6 December 1980;

NTM S. 11561-001, ♀ 13mm SL, ocean side of One Tree Island, 10m, H.K. Larson, from *I. hippuris*, 4 December 1974; BPBM 30549, 2 spec. 12.5-16mm SL, Lizard Island, off research station beach, 2m, H.K. Larson, from *I. hippuris*, 3 February 1975; AMS I.25304-001, 4 spec. 13-16mm SL, Lizard Island, Coconut Beach, 6m, H.K. Larson, from *I. hippuris*, 24 November 1975; NTM S. 11564-001, ♂ 16.5mm SL, Lizard Island, dropoff between Bird and South islands, 8m, H.K. Larson, from *I. hippuris*, 15 February 1977; AMS I.25303-001, ♂ 14mm SL, Lizard Island lagoon, 5m, N. Coleman, 14 January 1979; QM I.21566, ♀ 12mm SL, Lizard Island, research station beach, 2m, H.K. Larson, D.F. Hoese, from *I. hippuris*, 3 February 1975; CAS 56381, 3 spec. 11.5-14mm SL, Lizard Island lagoon, south side of Palfrey Island, 2m, H.K. Larson, from *I. hippuris*, 9 February 1975; QM I.21567, ♀ 17mm SL, Lizard Island, on dropoff between Bird and South Islands, 10-15m, H.K. Larson, from *I. hippuris*, 14 February 1977; SAM F. 5039, ♂ 17.5mm SL same data as preceding; WAM P. 28442-001, ♀ 16.5mm SL, same data as preceding; AMS I.25301-002, ♀ 18mm SL, same data as holotype; WAM P. 28441-001, ♂ 18mm SL, Lizard Island, dropoff by Bird Island, 6-10m, H.K. Larson, from *I. hippuris*, 14 February 1977; NTM S. 11562-001, 3 spec. 12-17.5mm SL, Lizard Island, east side of Palfrey Island, 3-5m, H.K. Larson, from *I. hippuris*, 1 February 1977.

Diagnosis. A small goby (up to 19.5mm SL), compressed posteriorly, more rounded anteriorly. Second dorsal rays 1,8; anal rays usually 1,8. Pectoral rays usually 14-15, the lowermost 2-4 rays unbranched and thickened distally. Pelvic fins short, cup-like, pelvic spine lobes and frenum fleshy. Gill opening extends forward to below posterior edge of eye. Teeth similar in male and female. No canine at side of lower jaw. Mean longitudinal scale count 45, TRB 11.

Description. First dorsal VI (in 37)*. Second dorsal 1,8 (in 37)*. Anal 1,8 (31)*, 1,9(5). Pectoral rays 12-15, usually 14*, with lower 2-5 rays unbranched (3 in holotype). Five specimens (11.5-14mm SL) have all rays unbranched. Longitudinal scale count 34-51, with a mean of 45*. TRB 9-12, with a mean of 11*. Second dorsal and anal rays all unbranched. Segmented caudal rays 17(4). Branched caudal rays 11(3). Gill rakers low, pointed, fine spines present only on posterior rakers. Lower quarter or so of first gill arch bound to opercle by membrane (barely bound in one specimen, about a third bound in another). Rakers 1+1+6(1), 2+1+5(1), 2+1+6(3). Vertebrae 10+15 (plus urostyle) = 26(1).

Body slender, compressed, more rounded toward head. Range of morphometrics in Table 12. Body depth at anus averages 15.5% (13.3-18.5%) of SL. Head rounded to roughly square in cross-section. Head length averages 30.5% (27.4-32.7%) of SL, head width usually greater than depth. Snout short, rounded to slightly pointed in dorsal view, 30% (24.3-36.2%) of HL. Eye large, set laterally, although eye extends onto dorsal profile, 31% (26.9%-44.7%) of HL. Jaws reach to below anterior half of eye, occasionally to mid eye. Lower jaw curves upward anteriorly, with upper lip overlapping lower. In ventral view, lower jaw somewhat pointed, forming triangle. Tongue trilobed, rarely blunt. Gill opening extends to below posterior rim of eye or further to posterior half of eye. Lateral line canals of head as in *B. yongei* (Fig. 2). Sensory papillae of head indicated in Fig. 17, with no fleshy knob on smooth suborbital. Preopercular edge slightly indented near lower preopercular pores, but not scalloped ventrally.

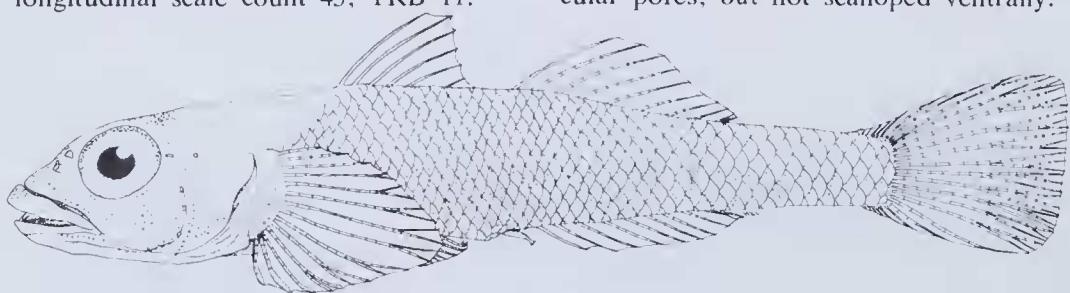


Fig. 17. Holotype of *Bryaninops isis*, 19.5mm SL ♂, AMS I. 25301-001, from Lizard Island, Qld.

Table 12. Proportional measurements of *Bryaninops isis* expressed as percentages of standard length (or head length where indicated) N = number of specimens

	Holotype AMS I.25301-001	Range	Males Mean	N	Range	Females Mean	N
Standard length	19.5	11.5-19.5	16.2	17	11.0-27.0	14.8	16
Head length	29.7	27.4-32.2	30.3	17	29.3-32.7	31.1	16
Head depth	18.5	14.8-18.5	16.5	16	15.2-24.3	17.6	16
Head width	20.5	17.0-20.7	18.7	16	16.9-20.0	18.9	16
Body depth at anus	16.9	13.3-17.5	15.6	16	14.2-18.5	15.7	16
Caudal fin length	19.0	18.9-23.6	20.7	14	18.9-25.0	21.3	16
Pectoral fin length	14.9	14.3-22.7	17.2	16	15.3-24.3	17.9	16
Pelvic fin length	16.9	14.1-18.8	16.1	16	14.4-21.3	16.0	16
Snout length (in HL)	36.2	26.5-36.2	30.1	16	24.3-34.2	29.8	16
Eye width (in HL)	31.0	26.9-32.7	30.3	16	28.9-44.7	31.9	16
Upper jaw length (in HL)	46.6	40.4-46.6	43.1	16	39.5-55.3	42.5	16
Interorbital width (in HL)	20.7	16.0-20.7	16.2	17	15.8-21.4	17.8	16
Caudal peduncle length	23.6	18.5-23.6	20.6	16	18.9-26.7	21.2	16
Caudal peduncle depth	8.7	8.0-10.0	8.8	16	7.9-9.2	8.7	16

Body scaled up to behind pectoral fins; head, nape and belly naked. Scales usually absent in a strip below most of first dorsal. Occasionally scales reach only to below median dorsal spines.

Pelvic fins short, round and cup-like, 16% (14.1-21.3%) of SL, reaching at least halfway to anus. Pelvic spines very short and straight. Pelvic spine lobes and frenum fleshy; lobes rounded, sometimes slightly folded. Membrane of rim of pelvic fin usually finely folded or papillose. Pectoral fins rounded, reaching to above pelvic fin tips. Lower unbranched rays and next 2 or 3 branched rays usually somewhat thickened distally. First dorsal triangular, does not reach second dorsal origin when depressed. Second dorsal as high as first anteriorly, low posteriorly. Anal low, equal in height to posterior part of second dorsal, with tip of rays occasionally thickened. Caudal truncate, with upper half longer than lower.

Teeth of males and females similar. In upper jaw, 3-5 curved canines across each side of jaw anteriorly; larger in males (canines usually hidden by upper lip). Behind canines, 2 or 3 rows of close-set, fine pointed teeth, usually slightly curved anteriorly; teeth straight, even in height and not so pointed at sides of jaw. Teeth at sides of jaw with tips bent anteriorly. Lower jaw with 2 or 3 (sometimes 4) crowded rows of quite small fine pointed teeth anteriorly, narrowing to 2 or 3 more regular rows at sides of jaw, extending along entire length of dentary. Teeth at sides of jaw generally

straight, angled outward slightly (to meet those of upper jaw, which are angled inward somewhat). One (occasionally 2) large curved canine at each side of lower jaw symphysis, behind rows of fine teeth. One or 2 smaller canine teeth sometimes present anterior to symphyseal canines, at outer edge of fine tooth band.

Male genital papilla short, broad-based, narrowing to slightly expanded tip. Tip with a lobe on each side of opening, and may be finely fimbriate or with additional lobes. Female genital papilla short and relatively bulbous, with several to many lobes around tip (generally several at each side).

Colour in life. Head and body generally translucent green or pale yellow (depending on host colour). Interorbit, snout and lower half of head translucent, dull greyish-blue to bright azure-blue (azure-blue may be present only around eyes and stripe around upper lip). Occasionally anterior half of body blue. Cheeks, opercle, pectoral base and lower half of body (especially peritoneum) bright iridescent green. About 9 reddish or brownish-orange internal body bars extend upward from vertebral column, anteriormost 6 most distinct, posteriormost bars may not be visible. Three indistinct brownish-orange bars cross peritoneum, and 7 or 8 narrow internal bars extend down from vertebral column on posterior half of body (posteriormost bars may be indistinct or absent). Lower bars do not correspond with upper body bars. Pair of brownish gold blotches overlaying brain (which

may be azure-blue). Yellow-orange blotch occasionally present on lower caudal base and peduncle. Dull red or orange stripe extends from eye to eye around snout and upper lip. Lower lip may be reddish. Iris bright orange, with pale gold rim. Fin rays greenish, membranes clear except for caudal which may be green or yellowish-green tinged, especially the lower half. Pelvies may be translucent green.

Very small specimens may be transparent, with blue and red pigments not visible, and green and brownish-orange markings subdued.

Colour in alcohol. Internal bars do not show through body wall, although peritoneum may be quite dusky and visible. Lower half of body variably (usually densely) speckled, upper half of body usually unpigmented or sparsely speckled. Most distinct markings are 2 brownish blotches on brain (just behind each eye) and dark streak from eye to around snout, including upper lip (lower jaw unpigmented). Scattered pigment present over sides of head and pectoral base (usually intensified as indistinct streak at base of pectoral rays). Holotype has entire pectoral base, cheeks and opercle evenly covered with brown speckling. Fins all clear.

Comparison with other species. *B. isis* differs from all other species in the genus except for *B. ridens*, in the absence of a large curved canine on each side of the lower jaw (and in other characters discussed in the Introduction). *B. isis* can be distinguished from *B. ridens* by its fully-scaled body (34-51 lateral scales, 27-37 in *ridens*), wider interorbital space (16-17% of HL, 11-12% in *ridens*); generally longer, more pointed snout (30% of HL, 26% in *ridens*); colour pattern and host specificity (*B. isis* is the only species which is found on *Isis hippuris*).

Remarks. This species seems to have a rather restricted distribution, having been collected only from the Philippines, Papua New Guinea, and the Great Barrier Reef, despite reasonable effort elsewhere. This distribution appears to be linked to that of the species' host inver-

tebrate, the gorgonian *Isis hippuris*. *B. isis* has never been found on any other species of invertebrate; however, hosts for the New Guinea specimens are unknown as the fishes came from a general rotenone collection. The distribution of *I. hippuris* is not well known, but has so far been recorded from the Philippines, Indonesia and the Great Barrier Reef, but not from the Red Sea, Indian Ocean localities such as the Chagos Archipelago or Sri Lanka, or the central or south Pacific.

B. isis is fairly common at Lizard Island, at depths of 1-15m, usually around 2-6m, in lagoon or reef slope areas. The gorgonian was often quite abundant, but fish were not found on every colony and were patchily distributed. The number of fish on each *Isis* colony varied from one to eight but it was usually impossible to collect all specimens from a single colony as the fish did not hesitate to dart off rapidly to adjoining colonies.

B. isis could almost be called a parasite rather than a commensal, as it eats the polyps of its host, *Isis*, as well as taking a few copepods. This dependence upon its host for both shelter and food is similar to that reported by Lassig (1976) for *Paragobiodon* (an obligate coral-dweller). The gut is quite long, with two main loops (the gut of the more predatory *Bryaninops* is short, with one simple loop). The close-set comb-like teeth seem suited to nipping off fleshy polyps.

Etymology. *Isis* is the host gorgonian for this species-specific commensal goby.

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REFERENCES

- Bayer, F.M. and Harry-Rosen, R.R. 1957 *Project coral fish looks at Palau*. Smithsonian Year 1956. Smithsonian Institution: Washington.
- Bermert, G. and Ormond, R. 1981 *Red Sea Coral Reefs*. Kegan Paul International: London.
- Burgess, W.E. and Axelrod, H.R. 1976 *Pacific Marine Fishes Book 7*. T.F.H. Publications, Inc.: New Jersey.
- Coleman, N. 1974 *Australian marine fishes in colour*. A.H. and A.W. Reed: Sydney.
- Davis, W.P. and Cohen, D.M. 1968 A gobiid fish and a paleomomid shrimp living on an antipatharian seawhip in the tropical Pacific. *Bulletin of Marine Science* 18: 749-761.
- Goren, M. 1983 On the occurrence of *Tenacigobius yongei* (Davis & Cohen) in the Gulf of Elat (Red Sea) (Pisces: Gobiidae). *Israel Journal of Zoology* 32: 135-137.
- Goren, M. 1984 Three new species and two new records for the Red Sea of invertebrate associated gobies (Gobiidae, Pisces). *Cybium* 8(1):71-82.
- Hubbs, C.L. and Lagler, K.F. 1958 Fishes of the Great Lakes Region. *Bulletin of Cranbrook Institute of Science* 26: 1-213.
- Jordan, D.S. and Seale, A. 1906 The Fishes of Samoa. *Bulletin of the Bureau of Fisheries* 25: 173-488.
- Larson, H.K. and Hoese, D.F. 1980 Fische des Indischen Ozeans XXIII, Gobiidae. 'Metcov' Forschungsschiffe-Ergebnisse, Reihe D 32: 33-43.
- Lassig, B.R. 1976 Field observations on the reproductive behaviour of *Paragobiodon* spp. (Osteichthyes: Gobiidae) at Heron Island Great Barrier Reef. *Marine Behaviour and Physiology* 3:283-293.
- Lassig, B.R. 1977 Socioecological strategies adopted by obligate coral-dwelling fishes. *Proceedings, Third International Coral Reef Symposium* 1: 565-570.
- Robertson, D.R. and Justines, G. 1982 Protogynous hermaphroditism and gonochorism in four Caribbean reef gobies. *Environmental Biology of Fishes* 7 (2): 137-142.
- Smith, J.L.B. 1959 Gobioid fishes of the families Gobiidae, Periophthalidae, Trypauchenidae, Taenioididae and Kraemeridae of the Western Indian Ocean. *Rhodes University Ichthyological Bulletin Ichthyological Bulletin of the J.L.B. Smith Institute of Ichthyology* 13:185-225.
- Wass, R.C. 1984 An annotated checklist of the fishes of Samoa. *U.S Department of Commerce, Technical NOAA Report NMFS SSRF-781*: 1-43.

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